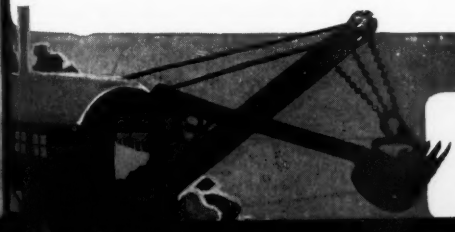
Pit and Quarry
SAND • GRAVEL • STONE
HANDLING • CRUSHING • SCREENING • WASHING

Detonated with Cordeau-Bickford

At the Spencer Quarries of the Midwest Crushed Stone Company, eighteen to twenty thousand tons of stone are shot at one time. Cordeau-Bickford Fuse is used to detonate the explosives.

For safety and efficiency use Cordeau-Bickford, and the results obtained will satisfy you that Cordeau-Bickford is a reliable, efficient detonating agent.

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut



May 1, 1925

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Circulation 7,600

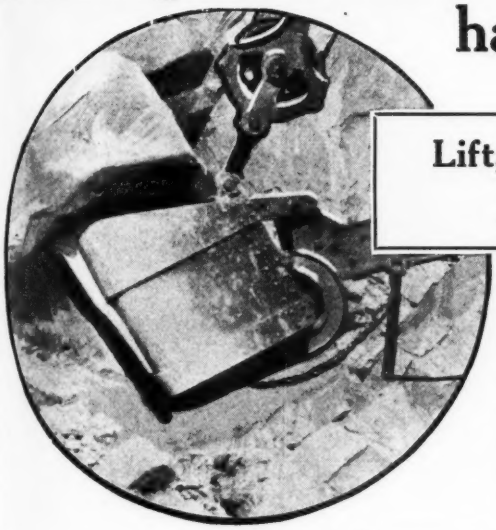
An Outstanding Achievement
at an Astonishingly Low Price

Write for Book 120!

INDUSTRIAL
CRAWLING TRACTOR CRANES

INDUSTRIAL WORKS · · · BAY CITY · MICHIGAN

Nothing like it for hard digging!



Lift, pry and twist— all together

The ERIE'S crowding and swinging engines *help* the hoisting pull in hard digging, instead of stealing power from it.

Your ERIE'S dipper meets a hard stratum in the quarry face— and tugs at it with an 8-ton hoisting pull. If that doesn't tear it loose, the operator *pries* with the crowding engines, and *twists* by swinging a little— while still hoisting at full power!

Direct drive, with independent engines for crowding and swinging, gives an ERIE the power to dig much harder materials.

Direct control of every shovel movement produces the instant action that means extra output in any kind of digging.

If you want a shovel to give big output in hard quarry work as well as in easy stripping, and to stand up without breakdowns to tie you up—

Get an ERIE, as reliable as the 3,400 past ERIES you've watched and heard about.

ERIE STEAM SHOVEL CO., Erie, Pa., U. S. A.

Builders of ERIE Shovels, Cranes, Draglines, Trench Hoes, etc.

Branch Offices: Boston, New York, Philadelphia, Pittsburgh, Atlanta, Chicago

Representatives throughout the U. S. A.

ERIE Revolving Shovels

"I Show You Good Drill—
CLEVELAND"

HE didn't know much about tact, this drill-running son of old Italy, but he knew when his work suited the boss, and he knew what drill made the work easy for him. Our competitor's machine is a good drill,—no doubting that,—but Tony couldn't help showing his enthusiasm for the Cleveland Forty-four.

Ask us for Bulletin No. 49

The Cleveland Rock Drill Co.

3734 East 78th Street

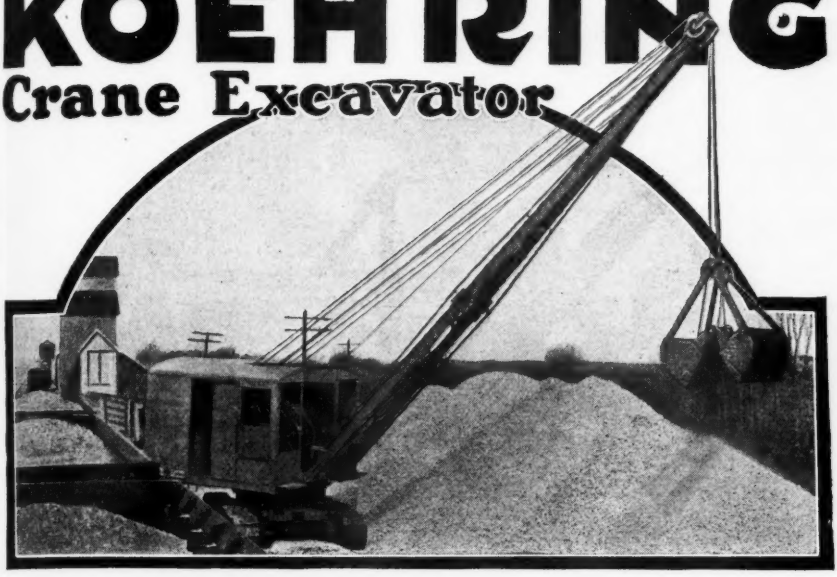
CLEVELAND, OHIO

CHICAGO, ILL. 605 S. Dearborn St.	NEW YORK CITY 30 Church St.	PHILADELPHIA, PA. The Bourse Bldg.	BOSTON, MASS. 113 Pearl St.
DETROIT, MICH. 428 Insurance Exchange Bldg.	ST. LOUIS, MO. 2091 Railway Exchange Bldg.	BIRMINGHAM, ALA. 403 N. 24th St. Box 2028	PITTSBURGH, PA. 922 Farmers Bank Bldg.

ASK YOUR OWN SUPPLY HOUSE FOR CLEVELAND DRILLS

CLEVELAND

KOEHRING
Crane Excavator



GENERATIONS of experience—shop, field and engineering experience—are behind the men who build the Koehring!

The Koehring Company brought together that kind of men—and told them "build a better machine than has ever been built before."

No outworn traditions held them back, no big investment in old patterns and shop equipment were to be considered. Their experience was free to build right, without restriction!

That's one reason why the Koehring is designed in every gear and detail for internal combustion engine power—why the Koehring finger-tip control adds no mechanical complications.

In countless important factors, the Koehring *is* a better machine than ever built before.

Crane Capacities

No. 1—10 tons at 12 ft. radius. ¾ cu. yd. clamshell bucket, sand or gravel, at 30 ft. radius. Boom lengths to suit conditions. 4-cylinder, 5x6 in. gasoline engine, 1,000 R. P. M. *No. 2*—15 tons at 12 ft. radius. Handles following loads, sand or gravel, (clamshell buckets): ¾-cu. yd. at 43 ft. radius; 1 cu. yd. at 37 ft. radius; 1¼ cu. yd. at 32 ft. radius. Boom lengths to suit conditions, 4-cyl., 5¾x7 in. gasoline engine, 1,000 R. P. M.

KOEHRING HEAVY DUTY

Write for Crane Excavator Bulletin No. Cr. 32

KOEHRING COMPANY

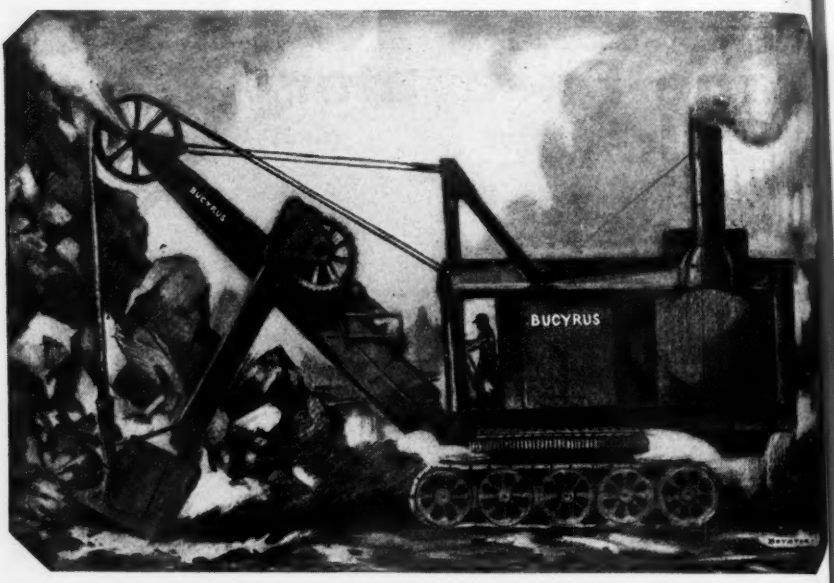
PAVERS, MIXERS—GASOLINE CRANES, DRAGLINES AND SHOVELS

MILWAUKEE, WISCONSIN

Sales Offices and Service Warehouses in principal cities

Foreign Dept., Room 1370, 50 Church St., N. Y.
Canada, Koehring Company of Canada, Ltd., 105 Front St., East, Toronto, Ontario.
Mexico, F. S. Lapum, Cinco de Mayo 21, Mexico, D. F.

A 2687-III-IV



Bucyrus Engineers Have Perfected A New 4-Yard Revolving Shovel

With Greater Ruggedness, Speed and Mobility

THIS new shovel—the 120-B—is a revolutionary development in heavy duty excavating machinery. In it, Bucyrus engineers have combined the advantages of the powerful railroad type shovel with those inherent to a revolving shovel.

Quick-acting, heavy digging, close-coupled and caterpillar mounted—it is built specially for quarry, mining and heavy rock excavation work.

Where more steel means lower maintenance and less repairs, more steel has been used. Revolving frame and base are solid steel castings. Shafts are built with 30 to 50% more strength than heretofore used in conservative design. Boom with the same section as a stripping shovel of twice its size.

Boiler has 10% more grate area and 15% greater heating suface than the most powerful railroad-type shovel. Superheater and fire-brick arch, as standard equipment, reduce fuel consumption from 20 to 30%. Electric shovel with latest Ward Leonard control and shunt motors.

Bulletin D-1201-A will give you the complete specifications—Copy gladly furnished on request.

BUCYRUS

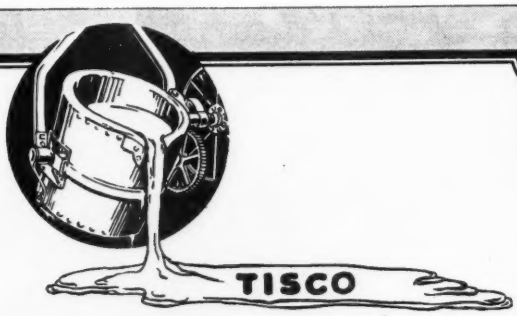
Established in 1880

Railroad Type and Revolving Shovels of All Sizes, Dragline Excavators, Trench Excavators, Dipper, Hydraulic and Placer Dredges, Spreader Plows, Wrecking Cranes

BUCYRUS COMPANY, SOUTH MILWAUKEE, WIS.

New York Chicago Birmingham San Francisco Portland Denver Tokyo London

A Special Plant at Evansville, Indiana, Devoted Exclusively to Small Revolving Shovels



VAN-PORT REVERSIBLE DIPPER TOOTH

(Patented)

The Van-Port reversible dipper tooth has been developed to meet actual demand. Owners and operators of steam shovels know that sharp digging teeth are necessary; they show economy.

Van-Port dipper teeth are now famous. They are always in efficient working condition because when they begin to get dull they may be reversed —whereupon they re-sharpen themselves. A set of these teeth points may be changed in fifteen minutes as it is not necessary to remove the bases.

Address Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

Taylor-Wharton Iron & Steel Co.
HIGH BRIDGE, N. J.

Wm. Wharton, Jr., & Co., Inc.
EASTON, PA.

Tioga Steel & Iron Co.
Philadelphia Roll & Mach. Co.
PHILADELPHIA, PA.

Guarantee

Owen Buckets, properly installed and operated, are guaranteed to do a bigger day's work than any other bucket of the same weight and capacity—

—or—

Write your own guarantee!

OWEN BUCKET CO.

A Mouthful at Every Bite

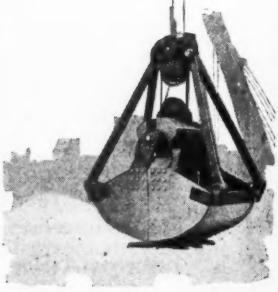
An Owen Bucket is very fittingly compared with a bull dog. Its tenacious grip tears the material from pile or ground as the bull dog tears the jugular from its victim—a mouthful at every bite.

It is not hard to understand this fact. Owen Buckets are built on the broad and simple principle of correct distribution of weight and properly applied leverage. Owen Buckets are mathematically correct in design and construction and their practicability has been proven under the most adverse conditions.

See for yourself. Folder 2-A tells how 60% of the weight is concentrated in the center where it holds the bucket down while the jaws "dig in." It also tells about the "cushion stop" on the counterweight that permits the bucket to hit the material *"cutting edges first"* without breakage.

It is easy to understand why "Owen" superiority will save money and make money for you.

Why not look it over? Send for folder 2-A.



A ¾-yard Type "J" Bucket. One of two Owen Buckets used by the Cuyahoga Paving Co., Cleveland, Ohio, at their asphaltum plants. These buckets handle sand and crushed stone from the pit into which the cars dump their material.

The Owen Bucket Company

506 Rockefeller Building Cleveland, Ohio

OWEN CLAMSHELL BUCKETS INSURE A BIGGER DAY'S WORK

Owen Buckets

INSURE A BIGGER DAY'S WORK

©O B Co

Du Pont chemical engineers insure uniformity of quality by chemical control through every step of manufacture from raw material to finished product.

Look for DU PONT and the ORANGE Band on every Powder Keg

THE du Pont "oval" trade-mark and the orange band identify every keg containing blasting powder made by the du Pont Company.

In the selection of raw materials, manufacturing procedure and supervision of production, every action has this purpose—to produce blasting powder of the highest quality.

The extensive use of du Pont Blasting Powder and the highly satisfactory results obtained are proofs of its superiority. There is a granulation adapted to every blasting operation—but only the highest grade of powder comes out of the keg marked with the du Pont "oval" and the orange band.

Make every shot sure

and select your blasting accessories with the same care as you choose your explosives. Du Pont Blasting Accessories give you maximum efficiency from your explosives. Protect your blasting investment by using only du Pont accessories.

E. I. DU PONT DE NEMOURS & CO., Inc.

Explosives Department

WILMINGTON, DELAWARE

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Buffalo	N. Y.
Chicago	Ill.
Denver	Colo.
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Mexico City	Mex.
Miami	Fla.
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San Francisco	Calif.
Scranton	Pa.
Seattle	Wash.
Spokane	Wash.
Springfield	Ill.

Du Pont Products Exhibit Atlantic City, N. J.

DU PONT

POWDER MAKERS SINCE 1802

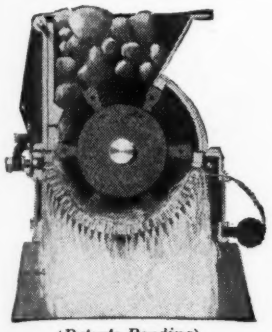
Considering all other things being equal so far as the two types of shovels are concerned—straight gasoline and Marion Gas-Electric—the latter is far more desirable in the matter of maintenance.

Marion Gas-Electric equipment requires little attention, usually far less than that necessary to keep mechanical clutches on straight gas shovels in good working order. Almost any steam shovel operator can keep the electrical equipment of the Marion Gas-Electric in good condition.

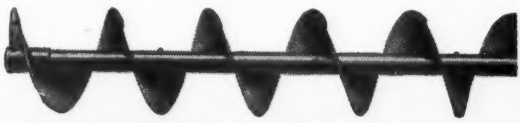
Marion Bulletin A-309, describing in detail the Model 21 Electric and Gasoline-Electric ¾ yard Revolving Shovels, will be sent you upon request. Write for your copy today.

The Marion Steam Shovel Co., Marion, Ohio, U.S.A.
Established 1884

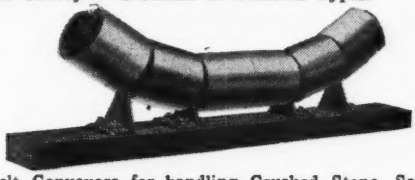
MARION



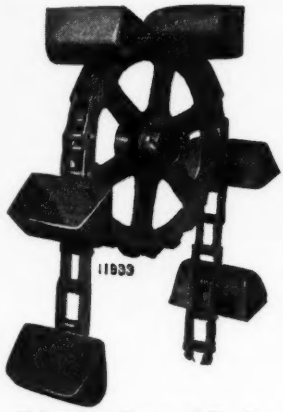
(Patents Pending)
Swing Hammer Pulverizer.



Spiral Conveyor—Sectional or Helicoid Types.



Belt Conveyors for handling Crushed Stone, Sand, Gravel, etc.



56 Standard Types of Bucket Elevators.

A Complete Standard Line for Elevating, Conveying and Pulverizing Requirements

Standardization of Jeffrey Equipment permits of it being laid in on plans, eliminating delay and expense.

Jeffrey Catalogs contain data, specifications, etc., that will enable the Engineer or Layman to readily select the proper types of equipment to meet his particular conditions or requirements.

THE JEFFREY MANUFACTURING CO.
917-99 North Fourth St., Columbus, Ohio

New York
Buffalo
Rochester, N. Y.
Philadelphia
Pittsburgh
Scranton, Pa.
Boston

Cincinnati
Cleveland
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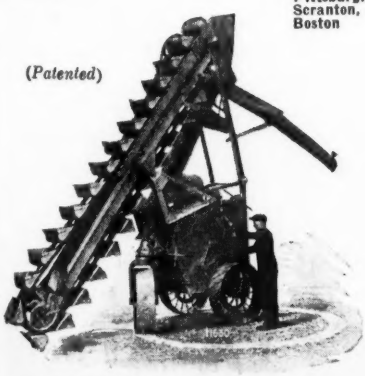
Chicago
Detroit
Milwaukee
St. Louis

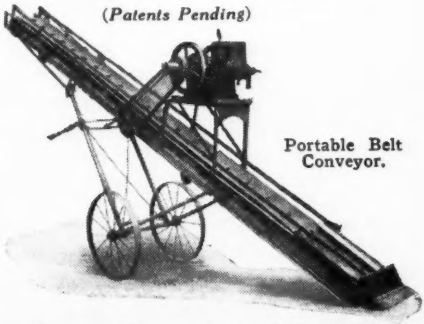
Denver
Salt Lake City
Los Angeles
Birmingham
Charleston, N. C.
Montreal

(Patented)



Radial Type Portable Loader.

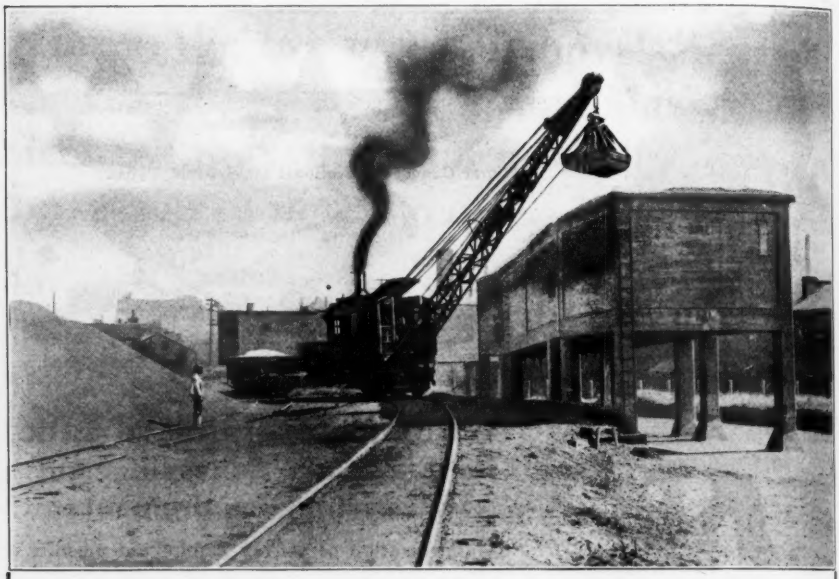
(Patents Pending)



Portable Belt Conveyor.

Handles loose materials, Brick, Tile, Boxes, Bags, etc.

JEFFREY
MATERIAL HANDLING EQUIPMENT



Here is an Important Reason Why the "American" Locomotive Crane is Best for Grab Bucket Work

"AMERICAN" Locomotive Cranes have an Independent Friction on the drum that winds the opening line of a clamshell bucket. Any crane owner who has experienced the advantages of this feature will tell you that in handling material from a car or bin, or excavating in a shored trench this one feature is the means of saving much time and avoiding much profanity.

Suppose that in lowering the bucket into a car or bin it catches on the edge; the minute any attempt is made to lift it with the regular hoisting line the bucket closes and takes hold. An "AMERICAN" Locomotive Crane will lift it clear with the opening line.

This is not the "AMERICAN'S" only point of superiority at grab bucket work. Ask us about the others.

AMERICAN
HOIST & DERRICK CO.
Saint Paul, Minn.
New York, Chicago, Pittsburgh, Seattle, New Orleans

The O-S Type "T" ¾Yd. Gas Shovel

Sound principles of construction and unrivaled records of dependability that have made O-S Cranes famous, are to be found in the ORTON & STEINBRENNER Power Shovels.

Glance at the illustration above. Note the ruggedness of that gasoline shovel; the correct design; the powerful appearance; the wide Flexible Tread.

The Crowding mechanism of the O-S gasoline shovel is connected directly to the main motor by the use of a shaft and gear drive. No chains or ropes are used. The crowding device is controlled by the operator through friction clutches—absolutely the last word in shovel construction.

The Power Shovel is fairly a new member of the O-S line of dependable equipment. Our twenty-five years of crane building experience has taught us what a power shovel should be, and we have made it so.

O-S

Locomotive Cranes
Flexible Tread Cranes
Clamshell Buckets
Orange Peel Buckets
Truck Cranes
Gantry Cranes
Power Shovels
Coal Crushers

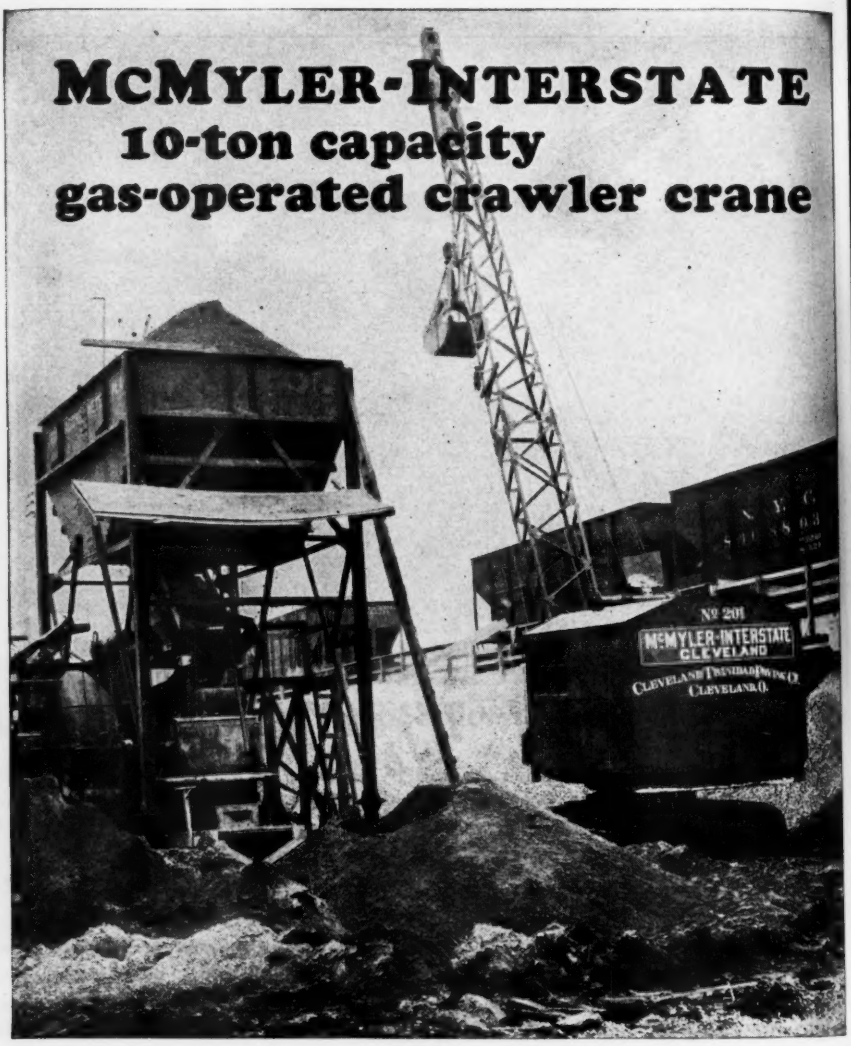
Catalogs and Specifications Will Be Forwarded On Request

ORTON & STEINBRENNER CO.

608 So. Dearborn Street

CHICAGO, ILL.

McMYLER-INTERSTATE
10-ton capacity gas-operated crawler crane



Ten ton capacity gas crane handling a ¾-cu yd. bucket on a special high-lift boom. Bulletin 66 describes this crane as well as the steam and electric types.

May we mail a copy to you?

Locomotive Cranes Pile Drivers Car Dumpers Clam-shell Buckets Derrick Cars

THE McMYLER-INTERSTATE CO., CLEVELAND

New York Philadelphia Buffalo Pittsburgh Detroit Chicago San Francisco

Modern Massillon Results

The 3/4–7/8 Range

Rips into any material

When you once see a Modern Massillon Steam Shovel at work and learn how it is made, you will understand our claims for it.

Power — Strength — Speed — Mobility — Low Maintenance — Accessibility — Engineering Economy — Interchangeable Repair Parts — are its outstanding features.

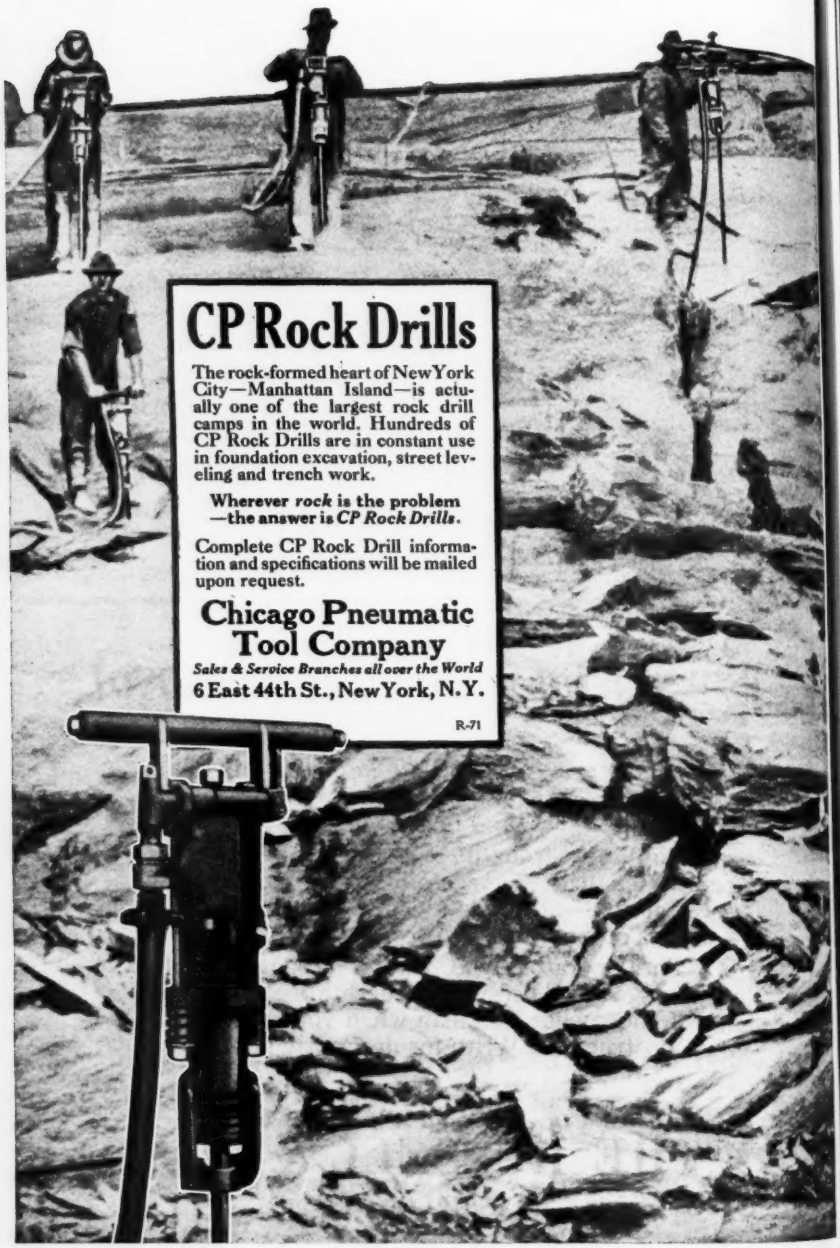
The operator who wants a rugged, hard digging shovel uses the Modern Massillon. You will know what we mean when you read how it is constructed. Write for descriptive details.

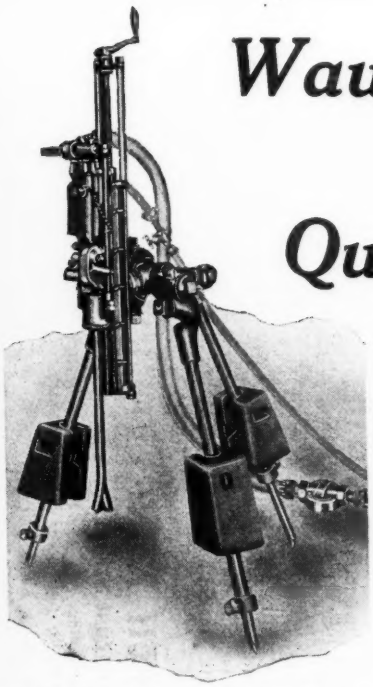
BUILT BY

THE RUSSELL & CO.

MASSILLON, O.

(Established 1842)


CP Rock Drills
The rock-formed heart of New York City—Manhattan Island—is actually one of the largest rock drill camps in the world. Hundreds of CP Rock Drills are in constant use in foundation excavation, street leveling and trench work.
Wherever rock is the problem —the answer is CP Rock Drills.
Complete CP Rock Drill information and specifications will be mailed upon request.
Chicago Pneumatic Tool Company
Sales & Service Branches all over the World
6 East 44th St., New York, N.Y.
R-71



Waugh Drills for Quarrying

Model 34 on Tripod, Showing Waugh Line Oiler No. 1 Attached

Waugh Rock Drills, suitably mounted, will be found most economical for quarrying operations in almost all classes of rock.

In limestone and other free cutting formations, 200 feet of hole per day may be conservatively expected. The use of a portable derrick rig simplifies the drilling of vertical holes 20' to 40' deep, and facilitates set-ups and steel changes.

Full information at the nearest branch office.

THE DENVER ROCK DRILL MANUFACTURING COMPANY

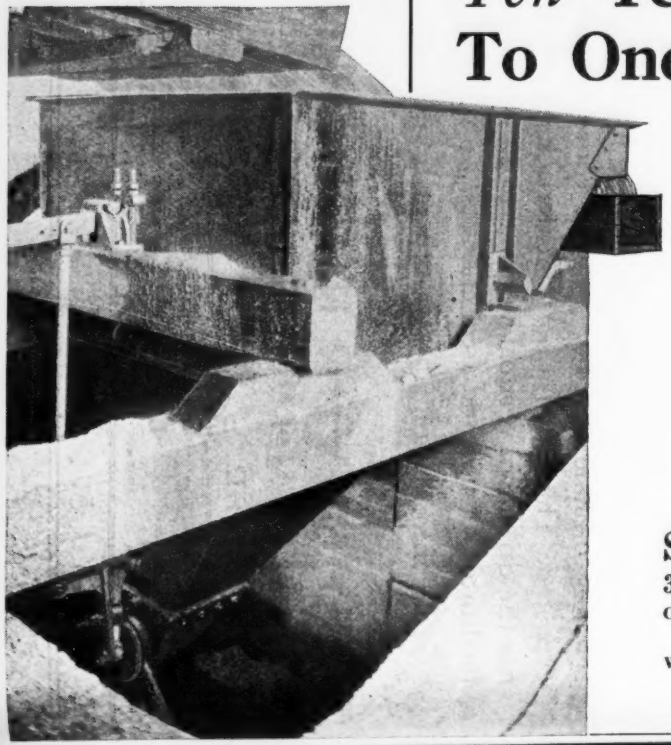
DENVER COLORADO

New York, Pittsburgh, Scranton, Pottsville, Mexico City — Chicago, Duluth, Houghton, Knoxville, Santiago — St. Louis, El Paso, Birmingham, Joplin, Lima — San Francisco, Seattle, Salt Lake, Butte, Wallace, Los Angeles

ROCK WAUGH DRILLS

Canadian Rock Drill Company, Limited, Sole Agents in Canada, Montreal, Quebec. Cobalt, Ont. Nelson, B.C. Vancouver, B.C.
The Denver Rock Drill & Machinery Company, Limited, Sole Agents in South Africa and Rhodesia, Southern Life Building, Johannesburgh, Transvaal, S. Africa
Andrews & George Company, Sole Agents in Japan, Tokio, Japan
Allied Engineering, Limited, Melbourne, Australia

Ten Telsmith Sand Tanks To One Gravel Producer—



In June 1924, Henry Steers Inc., 17 Battery Place, New York City, ordered one No. 8 (largest size) Telsmith Sand Tank. **In December, they ordered NINE more.** Steers is one of the largest and best equipped gravel producers in the east. Why has this concern adopted Telsmith Sand Tanks as standard? The explanation is simple. Telsmith works automatically all day and every day, discharging a thoroughly de-watered product from seven A. M. until quitting time, without even inspection. Other tanks slip occasionally, discharging the entire contents, dirty water and all, into the bins. The Telsmith duplex valve movement prevents that. The discharge is in small quantities, but practically continuous. A deep sand bed protects your sand bins against sudden gushes of dirty water. If you have sand tank troubles, this is the way out. Glad to send you bulletin No. ST 15. No obligation.

SMITH ENGINEERING WORKS

3183 Locust Street - - Milwaukee, Wis.

Old Colony Bldg. Chicago, Ill.

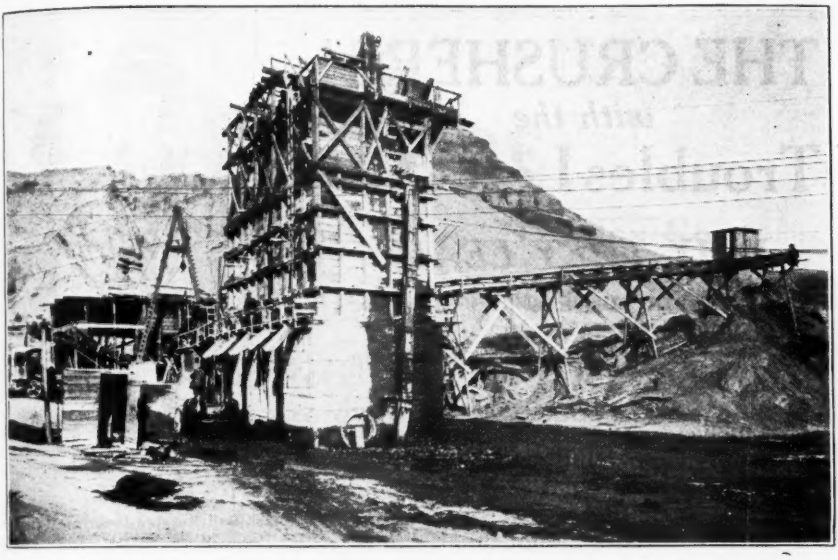
BECKWITH MCHY. CO. Pittsburgh—Cleveland

18 East 41st St. New York City

WALDO BROS. & BOND CO. Boston, Mass.

SEIBERT-MILBURN CO. Columbus, Ohio

BORCHERT INGERSOLL Inc. St. Paul, Minn.



Sand and Gravel Plant, designed, built and installed for Albany Gravel Company, Albany, N. Y. Capacity 400 yards per day.

Low Cost Operation

Low cost operation is in nearly all cases the result of three co-ordinated factors — proper design, dependable machinery, service behind the plant.

It is these three factors that make plants designed, built, equipped or improved by The Good Roads Machinery Company, noted for their low cost operation.

All plants furnished by us have proper design, dependable machinery and, behind them, expert service. Our Engineering Department has years of practical experience behind it. Our machinery has a country-wide reputation for durability and efficiency. Through our big organization of engineers, expert mechanics and salesmen, and because of our numerous distributing warehouses, we are able to furnish service that is of untold value to plant operators.

If you are considering the installation of a new sand and gravel or crushing plant, or if you expect to change or enlarge your present plant, we are at your service. Consult us by letter, wire, 'phone, or in person, without obligation.

Write today for Crushing Machinery Catalog K. A. U., or Sand and Gravel Machinery Catalog 5-A. Either will interest you and will be furnished without obligation.

THE GOOD ROADS MACHINERY CO., Inc.

KENNETT SQUARE, PA.

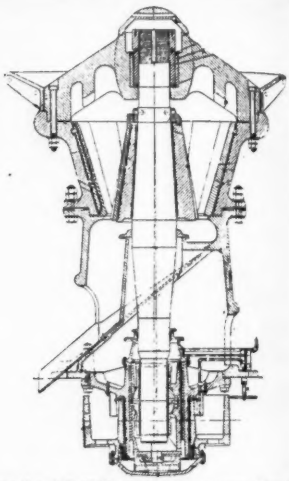
49TH AND HALSTED STS., CHICAGO, ILL.

SEIBERT-MILBURN CO.
Columbus, Ohio
BORCHERT INGERSOLL Inc.
St. Paul, Minn.
WALDO BROS. & BOND CO.
Boston, Mass.

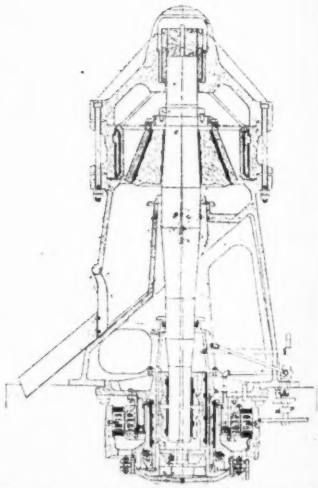
THE CRUSHERS
with the
Troubles Left Out

WHY THEY LEAD

1—They are noiseless and run like watches.
2—50% greater capacity for same power.
3—Practically no wear on anything but head and concaves.
4—Short shaft and saving in head room with packed dust collars.
5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.
6—Can be driven right, left, or standard, as sent from shop.
7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
9—Positive circulating oil system through filter and cut geared oil pump.
10—Made in our own shop by experts, trained for the job.
11—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.
12—Our fine crusher does the work of 4 geared crushers.



Standard Ball Bearing Gearless Crusher. Sizes No. 1 to No. 60—Weights 1,000 to 900,000 lbs.



Gearless Crusher for Fine Crushing. Do not be deceived by Vertical Concaves that is not what makes a fine crusher.

Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

KENNEDY VAN SAUN MFG. & ENGR. CORP.

50 Church St. **NEW YORK**

CIE. DES. ENTERPRISES INDUSTRIELLES, PARIS

NOTICE

Worthington Co. vs. Traylor Co.

GYRATORY CRUSHERS

IN the matter of litigation re gyratory crusher patents, according to the opinion of the Court of Appeals of the Third Circuit, we were judged infringing letters Patent No. 960, 231, claims 1, 2, 5, 6, 7 and 13 of the Worthington Pump and Machinery Corporation.

In accordance with said judgment, it is our desire that the public be notified that we, for some time, have not built or offered for sale a gyratory crusher embodying any of the above claims and that the machine we are now building and offering for sale, which is designated and known as the

BULLDOG GYRATORY CRUSHER—TYPE T

does not infringe any patent, but in itself is covered by patents 1,329,835, 1,329,848, 1,336,015 and there are others now pending in the U. S. Patent Office.

Traylor Engineering and Manufacturing Co.

ALLENTOWN, PENNSYLVANIA, U. S. A.

THE NEW AMAZON DRILL

Five to Ten Strokes more a minute!

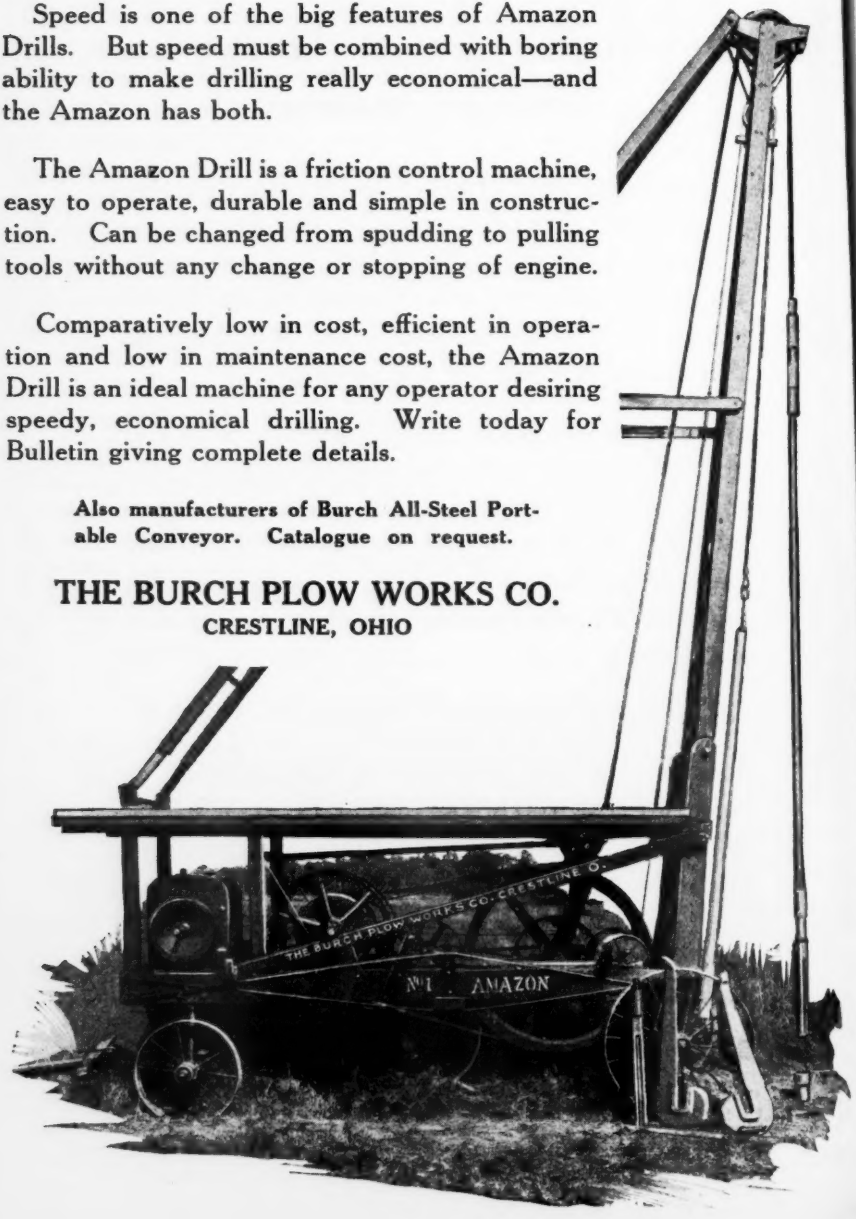
Speed is one of the big features of Amazon Drills. But speed must be combined with boring ability to make drilling really economical—and the Amazon has both.

The Amazon Drill is a friction control machine, easy to operate, durable and simple in construction. Can be changed from spudding to pulling tools without any change or stopping of engine.

Comparatively low in cost, efficient in operation and low in maintenance cost, the Amazon Drill is an ideal machine for any operator desiring speedy, economical drilling. Write today for Bulletin giving complete details.

Also manufacturers of Burch All-Steel Portable Conveyor. Catalogue on request.

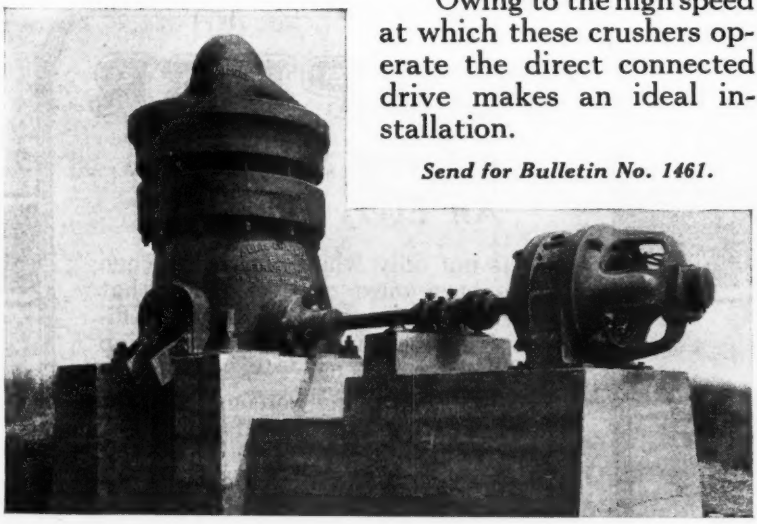
THE BURCH PLOW WORKS CO.
CRESTLINE, OHIO



Superior McCully Fine Reduction Gyratory Crusher

The most successful secondary gyratory crusher on the market today

Allis-Chalmers 6" Superior McCully Fine Reduction Gyratory Crusher direct connected to an Allis-Chalmers 50 H.P. type any slip ring motor @ 600 R. P. M. installed in the plant of the Hallock Sand Co. Columbus, Ohio.



Owing to the high speed at which these crushers operate the direct connected drive makes an ideal installation.

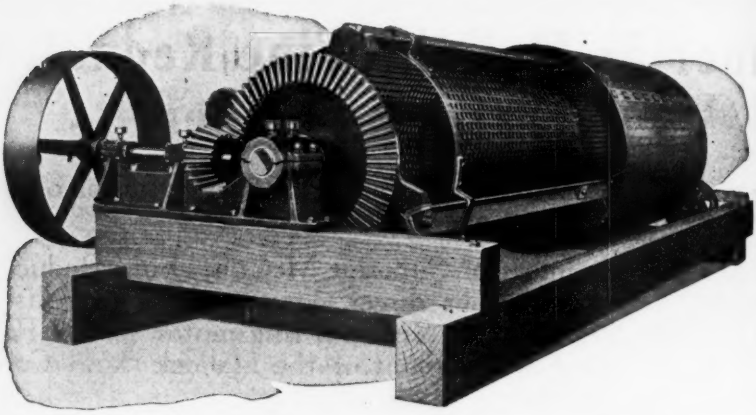
Send for Bulletin No. 1461.

Sizes, Capacities, Horse Power and Weights:

Size of Crusher in Inches	Two Feed Openings Size Each in Inches	CAPACITY PER HOUR IN TONS OF 2000 POUNDS — Size of Discharge Opening in Inches									DRIVING PULLEY		H. P. Required	Weight of Crusher in Lbs..
		¾	⅞	1	1¼	1½	1¾	2	2¼	2½	Size in Inches	R. P. M.		
6	6x40	24	28	32	40	48	....	....	....	....	36x12½	500	40 50	32000
10	10x52	....	....	....	....	80	94	107	120	135	36x18½	450	75 100	64000

ALLIS-CHALMERS

MILWAUKEE, WIS. U.S.A.



TOEPFER

Efficient Screening An Every Day Job

It is not only when it is new, when it has been oiled or overhauled that Toepfer Screens are efficient. Efficient Screening is an every day job with Toepfer Screens.

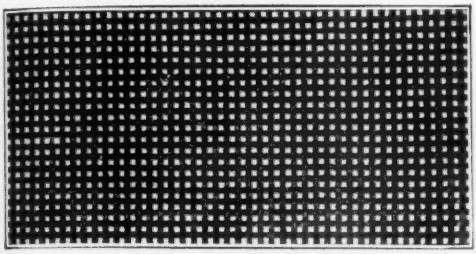
Toepfer Revolving Screens turn out clean, well sized material with less power than any other type of screen. Rigidity and perfect alignment have been engineered into these screens and the best of materials are used in construction.

A postal will bring you complete facts. They show why so many producers are specifying Toepfer Screens.

Write today

REVOLVING SCREENS
SCRUBBERS
ELEVATORS
FEEDERS
GRIZZLYS
CONVEYORS
BIN GATES
PERFORATED METALS

W. TOEPFER & SONS CO.
BROADWAY AND MENOMINEE ST. MILWAUKEE, WIS.



Cost Records That Proved the Greater Economy of Amsco "Cast-Woven" Manganese Steel Screens

A certain large mining company (name on request) changed to Amsco Manganese Steel "Cast-Woven" Screens after using ordinary wire screens. The results in **metal cost alone** during a period of 48 months were as follows:

Cost of ordinary screens,	**$2240.00**
Cost of Amsco screens,	**$1800.00**

Besides the saving in cost of screen metal—there was a considerably larger saving in lost production and wasted labor due to frequent replacement of less durable screens. Under the severe service encountered the Amsco "Cast-Woven" Screens performed for 48 months **and were still good** while the ordinary type screens required replacements every seven months.

For you, handling such abrasive material as sand, gravel, and crushed stone, Amsco "Cast-Woven" Manganese Steel Screens will prove an important factor in reducing screening costs.

Be prepared for a full season's screening operation without delays or replacements. Write for details and quotations, and also let us send you our Quarries Catalog.

See P&Q HAND BOOK Pages 348-404

American Manganese Steel Company

General Sales Offices: 388 East 14th St., Chicago Heights, Ill.

PLANTS: CHICAGO HEIGHTS, ILL., NEW CASTLE, DEL., DENVER, COLO., OAKLAND, CAL., LOS ANGELES, CAL., SOUTHERN MANGANESE STEEL CO., ST. LOUIS, MO.

AMSCO

TRADE MARK REGISTERED

OTHER AMSCO PRODUCTS

SAND AND GRAVEL PUMPS

PUMP SHELLS, LINERS, SIDE PLATES, IMPELLERS

DIPPERS

DIPPER TEETH

POWER SHOVEL PARTS

JAW PLATES

CHEEK PLATES

CRUSHER PARTS

CONCAVES

WEARING PLATES

CHAIN

SPROCKETS

GEARS

PINIONS

WHEELS

SHEAVES

ELEVATOR BUCKETS

PRODUCTS OF ASSOCIATED COMPANIES

BRAKE SHOES AND IRON CASTINGS
AMERICAN BRAKE SHOE & FOUNDRY CO.

MINE CARS & WHEELS
SOUTHERN WHEEL CO.

MALLEABLE CASTINGS
AMERICAN MALLEABLE CO.

UPSET FORGINGS
AMERICAN FORGE CO.

RAILWAY TRACK WORK & FIXTURES
RAMAPO AJAX CORP.

Salem Steel

Style "AA" Malleable Iron

What Material Are You Handling?

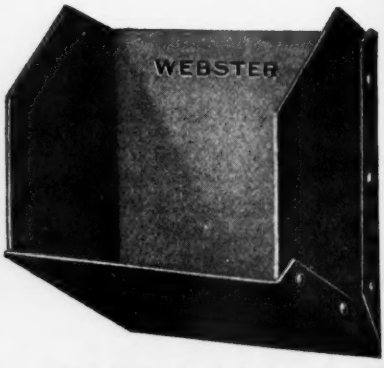
If it is sand, lime, gravel, cement, coal, ashes, ore, crushed stone, phosphates or any other gritty or abrasive material, there is a Webster elevator bucket for the job.

These buckets are made of the highest grade material and are properly designed. They load to rated capacities and discharge cleanly. Among the many varieties and sizes in the Webster line there is a bucket which precisely fits your needs.

When you need buckets, chain, sprocket wheels or complete elevators and conveyors, it will pay you to get in touch with us.

THE WEBSTER MFG. COMPANY
4500-4560 Cortland Street
CHICAGO

Style No. 1 Steel Continuous



Style No. 5 Steel Continuous

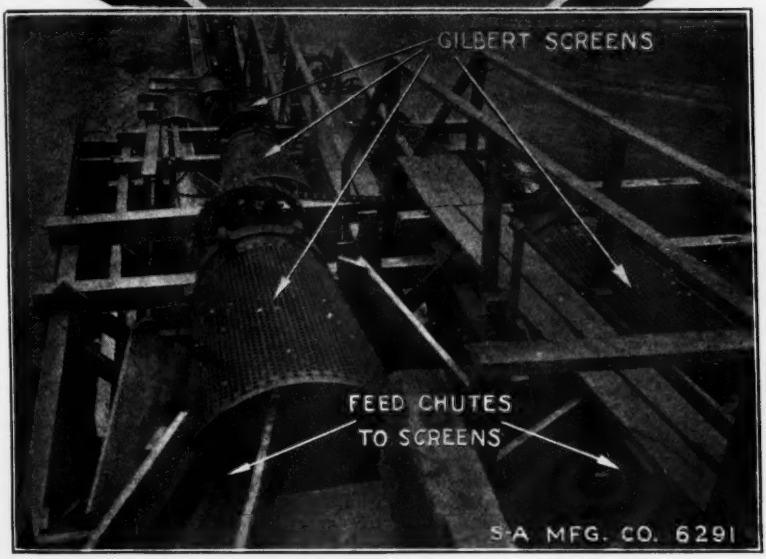
S-A GRAVEL WASHING AND SCREENING PLANTS

COMPLETE PLANTS S-A EQUIPPED

There is one sure way to obtain a thoroughly successful washing and screening plant.

Have S-A Engineers design and equip your installation.

6289



This plant is equipped with S-A Washing and Screening Machinery. The Gilbert Screens shown, wash the aggregate very effectively as it is being screened.

Write for sizes and capacities of S-A Gilbert Screens.

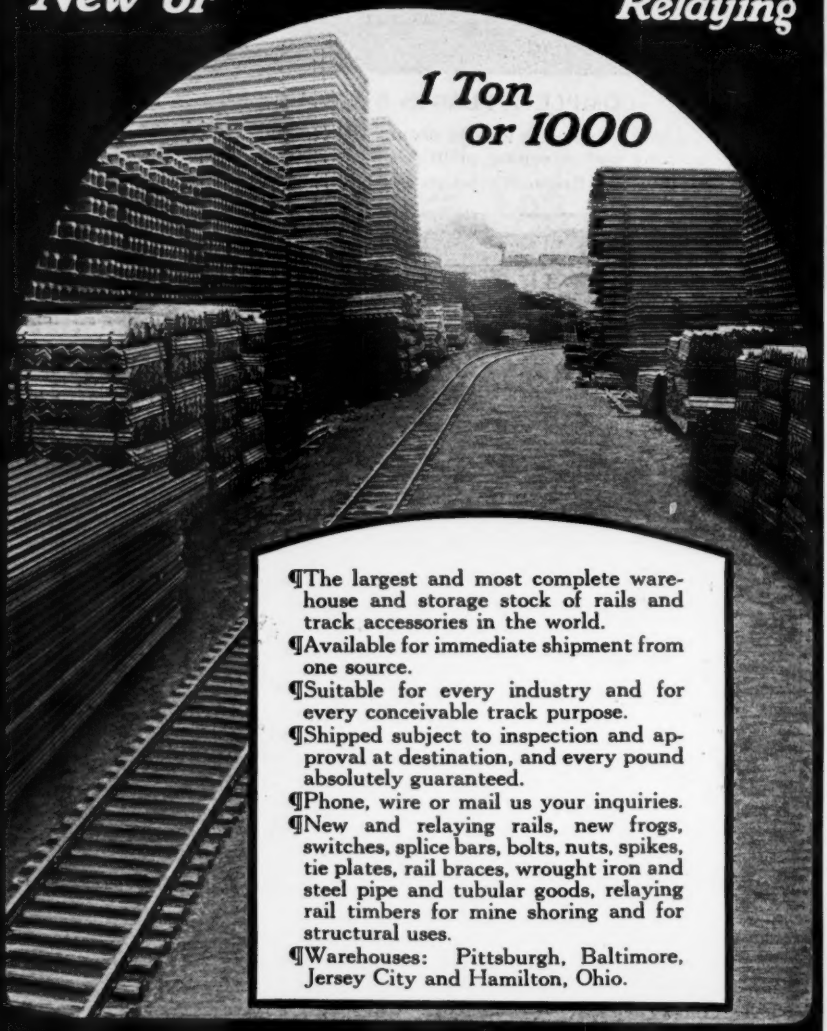
STEPHENS-ADAMSON

MFG. CO. AURORA, ILL.

RAILS

New or Relaying

1 Ton or 1000



¶The largest and most complete warehouse and storage stock of rails and track accessories in the world.

¶Available for immediate shipment from one source.

¶Suitable for every industry and for every conceivable track purpose.

¶Shipped subject to inspection and approval at destination, and every pound absolutely guaranteed.

¶Phone, wire or mail us your inquiries.

¶New and relaying rails, new frogs, switches, splice bars, bolts, nuts, spikes, tie plates, rail braces, wrought iron and steel pipe and tubular goods, relaying rail timbers for mine shoring and for structural uses.

¶Warehouses: Pittsburgh, Baltimore, Jersey City and Hamilton, Ohio.

L·B·FOSTER CO·

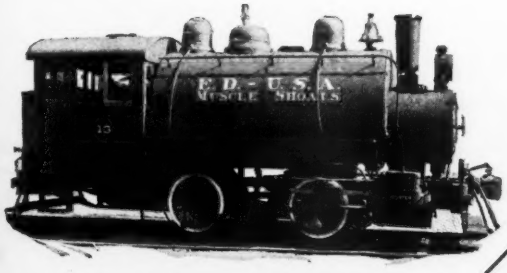
PITTSBURGH, PA. - NEW YORK, CITY

"The harder the work—the more you'll realize what a good locomotive your Porter is—"

Send the attached coupon—tell us your conditions of service—let us show you where a Porter will save your dollars in upkeep and pay for itself in savings and increased output.

H. K. PORTER COMPANY
Established 1865
PITTSBURGH, PENNA.

PORTER
"better built"
locomotives



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Pittsburgh, Penna.
Please mail us your Bulletin on Quarry Locomotives.
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Official Title.....
Address.....

A New Catalog of Electric Locomotives

Photographs and descriptions of numerous types of electric locomotives suited to all classes of service.

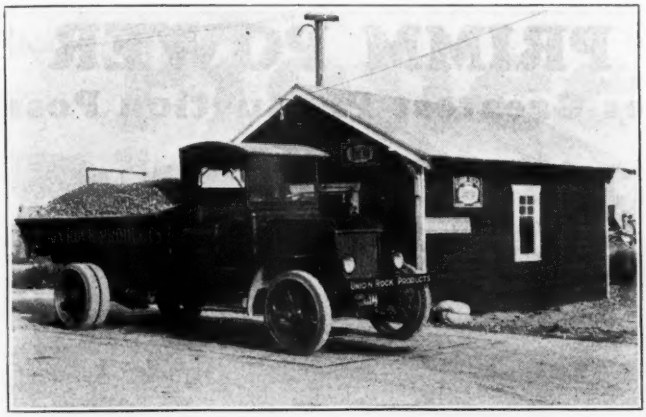
A complete electric locomotive handbook—a book that should be in the files of every man in charge of industrial haulage and materials handling.

Important points of electric locomotive construction and equipment are illustrated in detail.

A copy of this 56-page book will be sent you on request, if you are interested in industrial transportation. Write for book 250.

90

GOODMAN MANUFACTURING COMPANY
CHICAGO, ILL.



The Answer to Heavy Auto Truck Weighing

Type "S" Auto Truck Scales

To be successful your auto truck scales must withstand strains far greater than anyone dreamed of a few short years ago. The loads, not only greater, are largely concentrated on the rear wheels, making the shock on the scale doubly severe.

To meet this new condition it has been necessary to get entirely away from the former "wagon scale" construction and to follow the heavy scale construction of the railroad track scale.

This has been done in the Fairbanks Type "S." The construction used in this scale has proved its supremacy, first in the famous Fairbanks Track Scale and again under the crushing load of enormous grain elevator hoppers.

The success of this principle is now being repeated in the Type "S." Installation is easier, upkeep is forgotten; weighing and inspection are simplified.

One of our representatives will show you why the heavy weighing of today demands this super-scale. The coupon below will bring your copy of the informative booklet, "A Talk on Scales."

They are Measuring Rock Products by Weight

More and more, rock products are being measured, sold and bought by weight. Thousands of quarrymen and contractors have proved it is a more accurate—a more satisfactory method.

It's easy to measure rock products this way with a Type "S" Auto Truck Scale. It handles the largest truck loads accurately and safely. Everyone who has auto trucks to weigh will find much valuable information in the booklet, "A Talk on Scales." The coupon will bring a copy.

FAIRBANKS SCALES

NEW YORK
Broome and Lafayette Streets

CHICAGO
900 South Wabash Avenue

and more than 40 other principal cities, each with a service station.

The coupon will bring the interesting booklet, "A Talk on Scales"

(MAIL TO OFFICE MOST CONVENIENT)

Fairbanks Scales, Dept. SB-5,
Broome and Lafayette Sts., New York
900 South Wabash Avenue, Chicago.

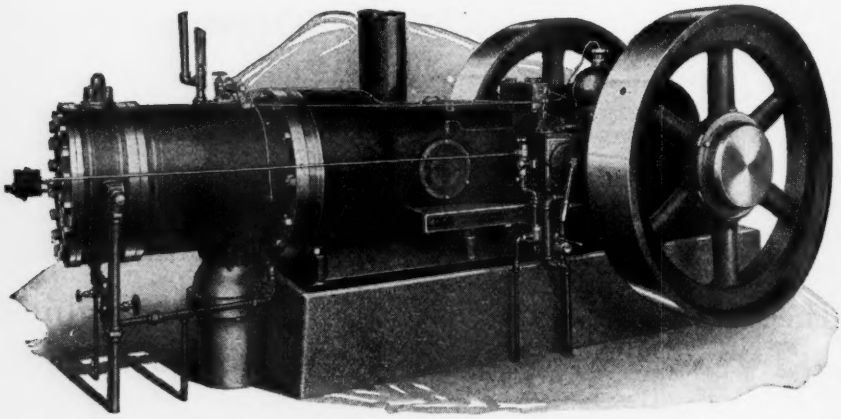
Please send your booklet, "A Talk on Scales," also Type "S" Specifications and full information about the economy of Type "S" Scales in weighing motor trucks.

Name .....

Address 1035

PRIMM POWER

Makes Greatest Production Possible



SAND — GRAVEL — CRUSHED STONE

A PRIMM Oil Engine will supply dependable economical power in the production of building, moulding and glass sand as well as gravel and crushed stone. PRIMM Power can be relied upon no matter what the load may be. At the limestone, cement rock and granite quarries it has proven its ability to stand up—year in and year out—producing reliable power usually at less than one half the cost of electric or steam power.

It will pay you to investigate PRIMM Oil Engines. They pay for themselves over and over again. No experienced engineers are necessary—any one can operate them.

PRIMM Service is Country wide. Our Engineers will gladly go over your power requirements with you. You will sell yourself on PRIMM Oil Engines once you thoroughly examine them and learn of the results they accomplish. Write us today.

SEMI-DIESEL

SINCE 1902

PRIMM OIL ENGINES

20 H. P. TO 300 H. P.

THE POWER MANUFACTURING CO.

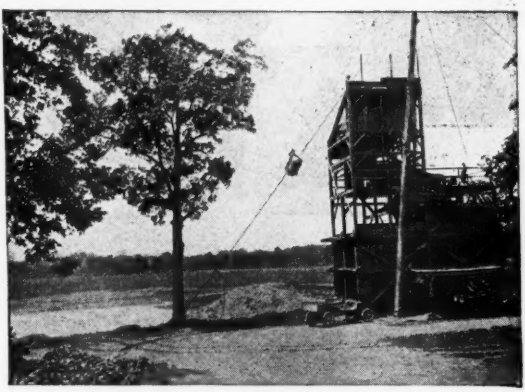
706 CHENEY AVE. MARION, OHIO

Branches and Representatives in the Following Cities

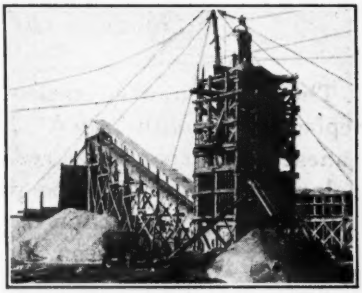
Dallas, Texas	Charlotte, N. C.	Cincinnati, Ohio	Harrisburg, Pa.
Crowley, La.	Jacksonville, Fla.	Phoenix, Ariz.	Tulsa, Okla.
Stuttgart, Ark.	Chicago, Ill.	Charleston, W. Va.	New York City

Pioneer
Back-Dump Bucket

We have a message for anyone interested in the production of sand and gravel. If you have the gravel — we have the bucket that can excavate, convey and dump into overhead bins or screen in one continuous operation. One man, operating a two drum hoist is all the labor required. The pictures speak for themselves. The "PIONEER" Back-Dump Bucket digs even better under water where it is impossible to use other equipment.



"One of our many successful gravel plants"



"Pioneer Bucket Dumping"

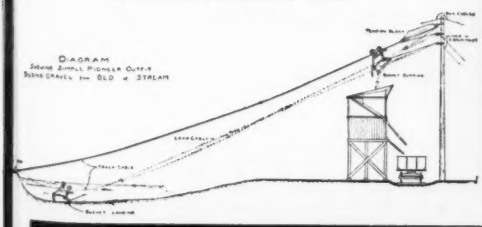
Let us tell you more about the "PIONEER."

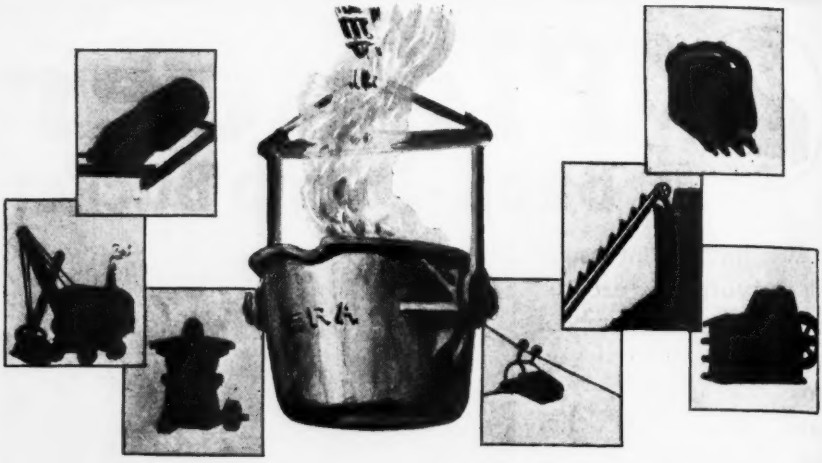
Send for our new Catalog T.

PIONEER BUCKET CO.

Successors to
THE MANSFIELD ENGINEERING CO.
1011 Fletcher Savings & Trust
INDIANAPOLIS, IND.

"Pioneer Bucket Loading"





The Steel that slashes repair bills

Repair parts of "ERA" Manganese Steel, through greater resistance to wear, cut delays to a minimum.

The operator who makes his replacements with "ERA" Manganese Steel repair parts, **reduces delays and repair bills to a minimum.** Steady production day after day, no midseason breakdowns, material delivered on time, more jobs handled. The season's close finds him with a bigger balance on the profit side of the ledger.

"ERA" Manganese Steel parts mean service. The characteristic of this steel is such that service, instead of breaking down its strength, actually toughens it so that the wear in each succeeding month's service is actually less.

We have persistently held to a stable price to make it possible to deliver a standard quality.

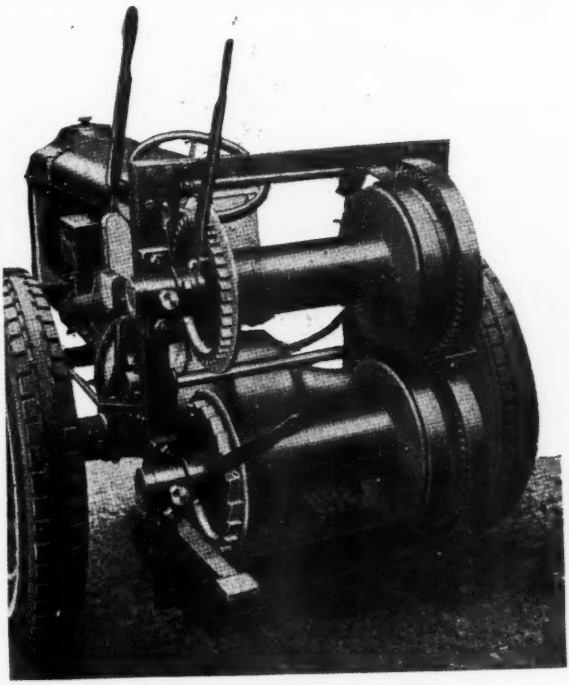
HADFIELD-PENFIELD STEEL CO.
Bucyrus, Ohio

MANGANESE STEEL
ERA
THE FIRST - STILL LEADS IN QUALITY

For Powerful and Economical Hoisting Use

Continental Winches

100 Per Cent Trouble Proof on the Job



THE CONTINENTAL DOUBLE DRUM FRICTION DRIVE WINCH

Continental Winches are made in two types—friction drive and gear drive—and come in two sizes—single and double drum. They are especially adapted to the Fordson Tractor and make an ideal power hoisting unit for drag-line cableway and scraper.

Speed ranges from 60 to 200 feet per minute on all lines. With a motor speed of 1,000 R. P. M. and a load of 3,300 pounds, a speed of 200 feet per minute on the line can be had; other speeds and loads in proportion.

Every Continental Winch is unconditionally guaranteed against defective workmanship and material. Defective parts will be replaced F. O. B. Memphis without charge. Any Continental Winch, whether single or double drum, friction or sliding gear type, may be used with rubber tired or regular Fordson Agricultural Wheels. Write today.

SPINKS SUPPLY CO.

MEMPHIS, TENN.

Williamsport Wire Rope will prove just as efficient in Pits and Quarries.

The Universal Crane Co. who use

WILLIAMSPORT WIRE ROPE

Telfax Tape Marked Factory certified

exclusively on their cranes state "we ship our cranes to many out of the way places of the world where high grade equipment is absolutely necessary to assure continuous performance far from a supply of spare parts."

"We are equipping our machines with Williamsport Wire Rope as part of our policy to give our customer the best equipment on the Universal Crane throughout that is possible."

"Next week we are shipping a crane to Russia."

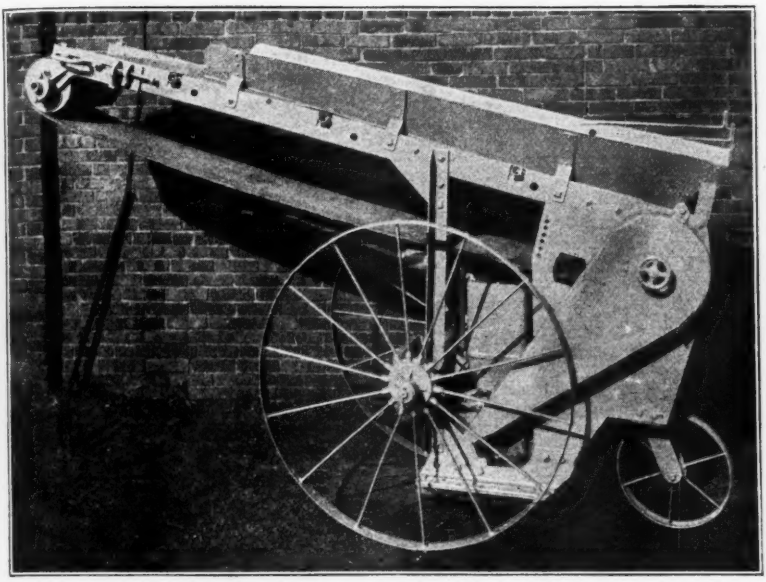
Let us tell you more about it.

WILLIAMSPORT WIRE ROPE CO.

Main Office and Works:
Williamsport, Penna.

General Sales Office:
Peoples Gas Bldg., Chicago

Why You Should Use



Ottumwa Box Car Loaders

Efficiency and Economy are outstanding reasons for using the Ottumwa, but there are plenty of others. For instance:

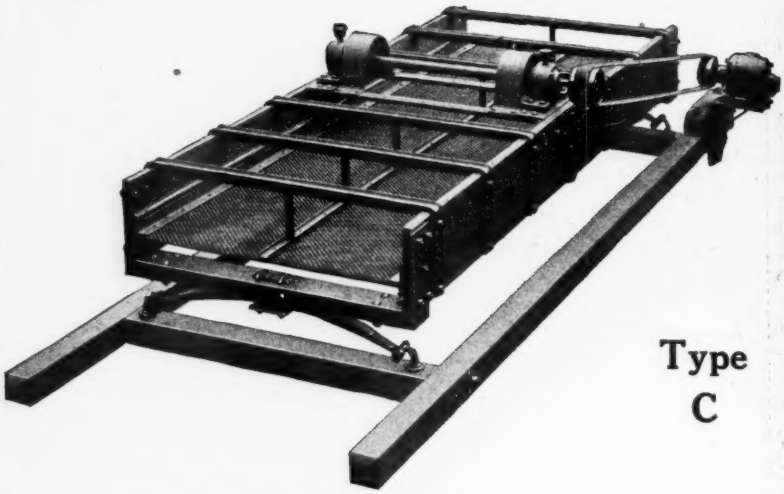
Permits increased tonnage and Maximum Output. Far superior to hand loading. Cheapens production. Box cars can be loaded as cheaply as open cars by using the Ottumwa.

Careful handling results from use of Ottumwa Conveyor Belt Box Car Loader. Helps solve labor problem. Cuts down your force.

Lastly, the first cost of an Ottumwa Box Car Loader is reasonable. Write for Bulletin giving complete details.

OTTUMWA BOX CAR LOADER CO.
OTTUMWA, IOWA

UNIVERSAL VIBRATORS



Type C

Universals Are Giving Entire Satisfaction on Hundreds of Installations

A FEW PROMINENT USERS

Carnegie Steel Company
Consumers Company
New Jersey Zinc Corporation
Virginian Limestone Corporation
Central Sand & Gravel Company
Consolidated Stone & Mining Co.
Southern Clay Mfg. Company
Tractor City Sand & Gravel Co.
The Standard Slag Company
Casparis Stone Company
Woodstock Slag Corporation
L. D. Smith Stone Company
Buckeye Shale Brick Company
Petersen Sand & Gravel Company
Roden Coal Company
Tulsa Stone Company
Black Diamond Coal Mining Co.
Howard Sand & Gravel Company
Acme Silica Company
The Greenlawn Gravel Company
Lehigh Stone Company
Belvoir Stone & Supply Co.
Chicago Union Lime Works
A. C. O'Laughlin Stone Company
The Buffalo Slag Company
The Acme Limestone Company

Write for your copy of Catalog No. 50

UNIVERSAL VIBRATING SCREEN CO.

RACINE ~ ~ WISCONSIN

See P&Q HAND BOOK Page 426

Free Service to our readers

For the convenience of readers who are in the market for equipment, our "Free Service" department will furnish on request any information, catalogs and prices on any machinery, equipment or supplies used in pits and quarries. The coupon below makes it easy for you. Simply check, sign and mail.

Pit & Quarry, Rand McNally Bldg., Chicago, Ill.

Pit and Quarry, Research Department,
Rand McNally Bldg., Chicago, Ill.

WE ARE IN THE MARKET for the items checked below, and would be glad to receive catalogs, prices or other information.

- ☐ Agitators
- ☐ Air Compressors
- ☐ Air Compressors, Portable
- ☐ Babbitt Metal
- ☐ Baffles
- ☐ Bag Filling Machines
- ☐ Bag Sewing Mach.
- ☐ Bags, Cotton
- ☐ Bags, Paper
- ☐ Barges
- ☐ Barrels, Steel
- ☐ Belt Fasteners
- ☐ Belting, Conveyor
- ☐ Belting, Transmission
- ☐ Bin Gates
- ☐ Bins, Clay Tile Storage
- ☐ Bins, Concrete Storage
- ☐ Bins, Steel Storage
- ☐ Blasting Fuses
- ☐ Blasting Powder
- ☐ Block Machinery, Concrete
- ☐ Boiler Compound
- ☐ Boiler Skimmers
- ☐ Boilers
- ☐ Brick Machinery, Concrete
- ☐ Buckets, Conveyor
- ☐ Buckets, Grab
- ☐ Buildings, Portable
- ☐ Burners, Oil
- ☐ Cable Coatings
- ☐ Cableways
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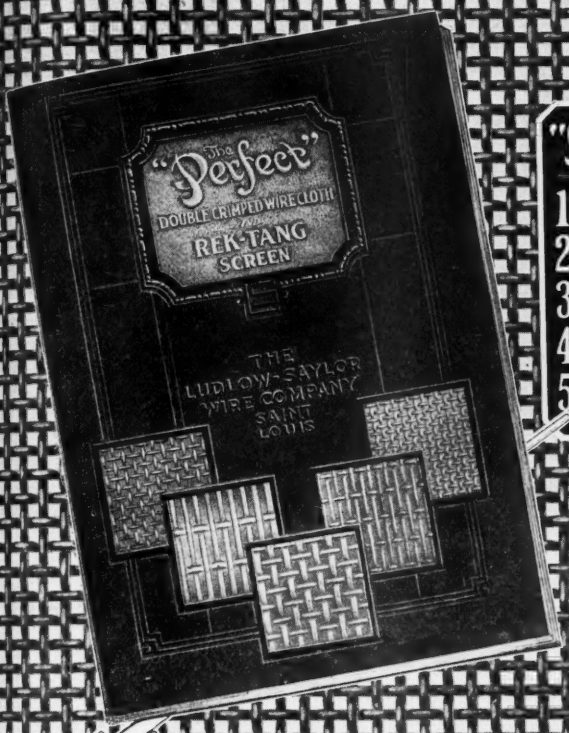

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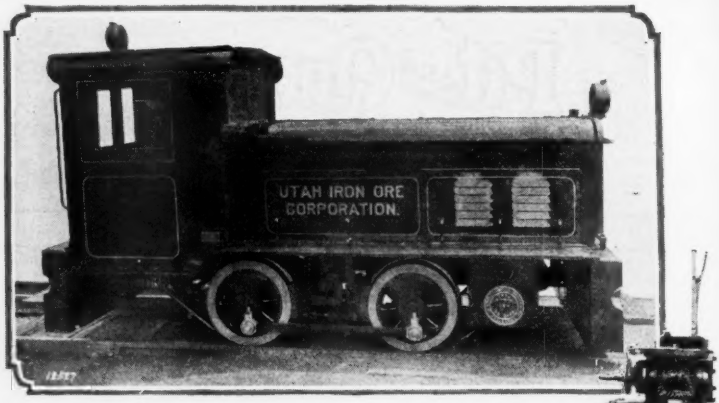

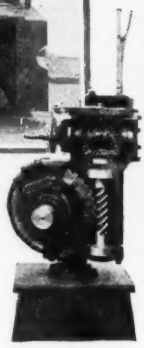

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GASOLINE LOCOMOTIVE

Pit and Quarry

A Semi-Monthly Publication for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metalic Minerals.

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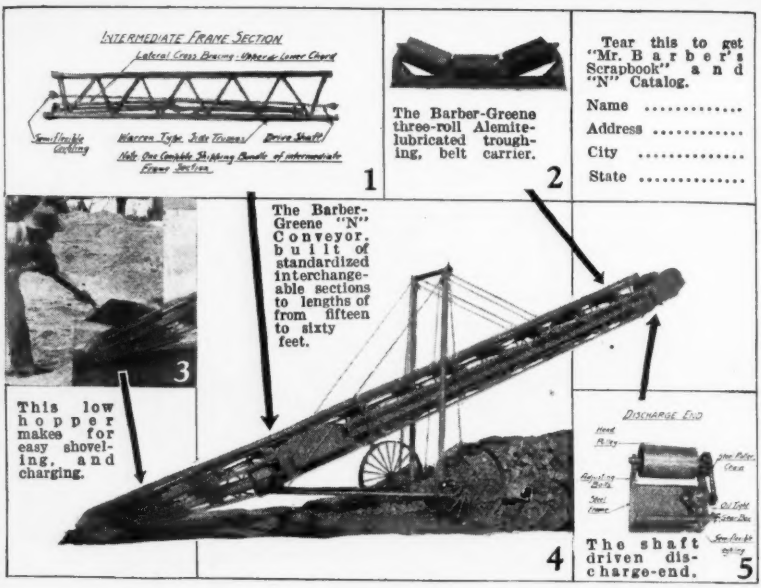
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Pit and Quarry

Vol. 10 Chicago, Ill. May 1, 1925 No. 3

Controlling Turnover

WASTE of any kind in industry is a vital problem to the executive. To cut down waste is his constant aim. Every investigation of labor turnover reveals points of waste. The expense of hiring, of adjusting the worker to his job, and of training him in efficiency must be repeated with each new man. Accident occurrence is twice as frequent during the first months of employment. Waste from lost speed and from poor work is greater with new men. New employees require more supervision than seasoned laborers and hence bring a higher overhead. Every employee who leaves takes with him something of value in the way of knowledge or special skill which is the result of valuable training. Such losses cut in on profit. A scientific investigation will determine exactly what the loss is in dollars.

This waste of labor turnover is often overlooked in organizations in which there is little standardization. A badly managed plant is not greatly disturbed by labor turnover. In such a plant there is often so great a variety of wastes that this one is scarcely noticed. In plants where there is a good system of training and well planned methods of production there is greater cost involved in change of workmen. When efficiency prevails, the cost of labor turnover increases in direct proportion with that efficiency and is taken into account with other costs that must be controlled. The employee in a well managed plant has increased his knowledge and has required more time in training and therefore takes away more than the employee in a poorly managed plant.

Numerous methods have been tried at different times to reduce turnover, but unless these efforts have been based on sound principles of scientific management, they have been doomed to failure. Amusements such as movies, sports, etc., have been used; petting and coaxing have been resorted to; and appeals to loyalty and high principles of ethics have had a temporary effect. These experiments are all tried out for one purpose and that purpose is a good one. Every executive knows that he must build up a good morale, a plant loyalty, a spirit of team work if his organization is to function efficiently. In the old days a notion prevailed that it required some sort of mysterious gift to secure this spirit of loyalty, but that theory has been exploded. That seemingly intangible thing called morale has been analyzed; its elements have been classified; and methods of creating it have been determined .

The first requisite of good team work in a plant is a permanent group. There cannot be a sound feeling of mutual service, of obligation, or of loyalty in a constantly changing personnel. Statistics show that labor turnover ranges from 100 to 200 per cent annually. In other words more persons are hired in each industry during the year than are working at any one time. It is worth while for any executive to determine what per cent indicates the relation of the number of employees hired annually to his average permanent force. The rate of turnover is considered a fairly accurate standard of business efficiency. When labor turnover reaches 200 per cent annually, the waste is equivalent to that resulting from a strike. The disorder is spread over the entire year but the loss, if estimated, would undoubtedly equal that of a strike of several weeks' duration. It is with a permanent group that plant loyalty can be maintained.

The best way to reduce turnover is to operate under efficient manage-

ment. There is no desire on the part of most employees to have high turnover. Their best interests lead them to prefer permanent jobs. Hence the causes of turnover should be determined and dealt with scientifically. If it is found that a large percentage of turnover is caused by dissatisfaction with wages, it is an indication that the wages paid are below the market rate and that the employees who are retained are too inefficient to command the market rate. Scientific management cannot prevail with a uniformly inferior group of workmen. Therefore a study of the wage situation will be a part of a program of economy.

If sickness is a cause of high turnover, it is possible that some simple changes in working conditions may take care of the situation. If there are many cases of employees' being discharged because they are incompetent or insubordinate, it is advisable that the chief executive give consideration to his minor executives. A mistake in the placing of a foreman may bring an unnecessary and expensive turnover, while a shift of places may result in more satisfactory conditions for all concerned. While there are conspicuous exceptions to the rule, it is safe to assume that every man in the organization from the highest subordinate to the most ignorant workman prefers to be successful in whatever he is doing. It is the responsibility of the executive to have his men so placed that they are of the greatest value to him. This occurs when they are placed where they work with most satisfaction to themselves. Hence all supervision and discipline should be of such nature as to build up plant loyalty.

A sure method of reducing turnover is to create a pride in the product. Interest in the work comes with knowledge of the results of the work. Employers who keep their employees informed as to the importance and good quality of the produce which they are producing are well repaid for their efforts. Executives who spend lavishly in order to build up good will in the market will be wise if they also give some thought to advertising the product among the workmen. An employee likes to boast of the firm for which he works; he enjoys being enthusiastic about its standing among other members of the industry. He has a personal pride in up-to-date equipment; he gets great satisfaction out of a new and powerful machine. The installation of a new piece of equipment which is the latest model is a matter of personal satisfaction to the men who are to operate it. It means to them that their product will be second to none on the market. Their pride in that product will be measured in the profits of the business at the end of a year. They will not be quick to leave a plant that they think of with pride.

A permanent group producing a commodity in which they are interested will build up traditions. No factor will be more effective in reducing turnover than solidarity based on traditions. A group of workmen during a noon hour entertaining themselves with the immortal, "Do you remember when" stories, will be held together by their pride in the past. There was the time when a production record was broken, when an accident was averted by some one's thoughtfulness, when an unusual occurrence resulted from a blast. There are also humorous things to be remembered and talked over. Traditions weld the group together and keep them on the job. All are factors in eliminating the waste of turnover which is an unnecessary waste. And all reduction of waste proves its worth when the financial reckoning comes at the end of a year.

Protect the Interstate Commerce Commission

PROTECT the rate-making powers of the Interstate Commerce Commission from infringement by congressional action. Join hands with all groups opposing congressional interference. Stimulate action in those groups which you mingle with.

If Congress is allowed to set a strong precedent for such interference, law after law will be passed benefiting certain sections of the country or certain industries. The Gooding bill and the Butler bill are only forerunners of many such measures which are coming.

These two bills will reverse decisions reached by the Interstate Commerce Commission after much detailed study of intricate conditions.

Operating a Small Lime Plant on Labor Contract Basis

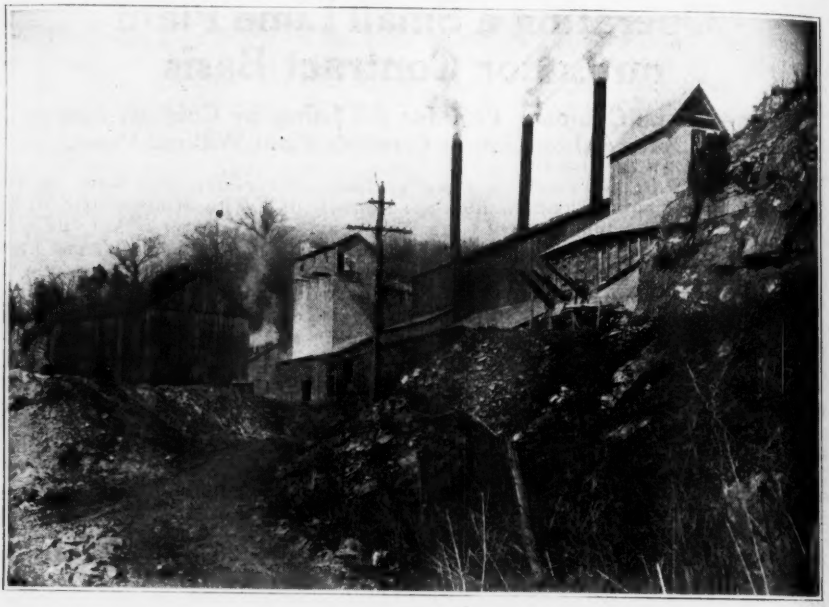
Limeton Lime Company Pays for All Labor by Contract System Stone Delivered to Kilns or Crushing Plant Without Power

FRONT ROYAL, Virginia, is situated in the beautiful Shenandoah Valley at the junction of the north and south branches of the Shenandoah River. It is often referred to as "The Gateway to the Great Eastern National Park." This proposed park consisting of an area 100 miles in length and 12 miles in width lies in the Blueridge Mountains of Virginia. The lime plant of the Limeton Lime Company is just outside this beautiful area on the Norfolk and Western Railway and the South Branch of the Shenandoah River.

This lime plant is small but efficient. We do not know of a lime plant producing any more lime per unit and per dollars invested. The stone is a high calcium running 98 per cent pure. The quarry is so located that power is not required in bringing the stone to the kilns or the crushing plant. The breast of rock, which runs from 40 to 60 feet in height, lies above the level of the stone floor. The stone drifts in on so nearly a level track that the men are able to push the empty car back with very little effort. The quarry is only 100 yards from the kilns. In years to come when the stone on this level is exhausted, it will not cost any more to bring the stone to the kilns as the saving in the present cost of top dressing will pay for elevating the stone. Ingersoll Rand drills are used in the quarry.

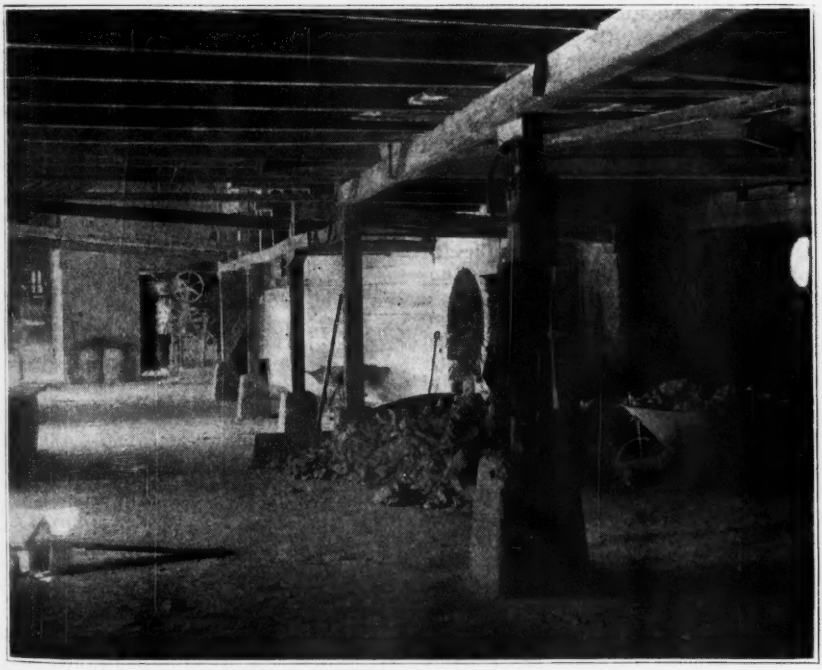
The plant consists of three Ironclad Coleman kilns, an Austin-Western crusher and a Schulthess hydrator. This hydrator was purchased in Switzerland, and we believe is the first one in operation in this country. Since this machine was purchased the McGann Manufacturing Company of York, Pennsylvania, has secured the rights to manufacture and sell this hydrator in this country as well as in Canada, Cuba, South America and Porto Rico.

View of Limeton Mill Showing Railroad Facilities.



Another View of Mill.

A Quarry View.



Two Interior Mill Views. Upper View Shows Hydrator and Lower View Shows Kiln Firing Floor.

All labor is paid for by contract at a specified rate per barrel produced. The annual capacity of the plant is 65,000 barrels at the present time.

The Schulthess hydrator consists of a long plate steel cylinder mounted on heavy steel bases. In the center of the hydrator is a steel shaft to which are fastened steel mixing and transporting blades. A countershaft is provided with the necessary tight and loose pulleys and a pair of spur gears to connect the countershaft to the hydrator shaft. The necessary bearings and stands are furnished for the main shaft and also for the countershaft. The feed end of the hydrator is provided with a plate steel hopper from which the lime is fed into the coarse mesh sieve, or slaking cylinder, and this sieve is mounted on the hydrator shaft. The lime from the slaking cylinder is discharged into the hydrator and the dry hydrated lime leaves the remote end of the hydrator through the discharge chute.

The burnt lime, as it comes from the kilns, is fed into the plate steel feed hopper without any previous breaking up being necessary. The sieve, or slaking cylinder, is open at the hopper end and is fitted with a sprinkler pipe along the top. The shaft is set in motion by means of the pulley drive and the necessary quantity of slaking water is introduced at the same time through the sprinkler pipe. Under the influence of the heat and steam generated the crude lime is reduced to lime powder or small pieces. The material falls through the sieve into the main body of the hydrator only after sufficient slaking, and the consequent reduction in size has taken place.

The partially slaked lime in the hydrator is then thoroughly mixed and broken down mechanically, being also subjected to the beneficial effects of the intense heat and steam produced. As the lime is being slowly propelled along the hydrator, it is completely slaked and transformed into very fine calcium hydrate powder, and ultimately leaves the hydrator in an absolutely dry state and is relatively pure. Each individual lump of lime receives a preliminary slaking in the revolving sieve, and the production of pure, dry hydrated lime is thereby accelerated to a remarkable degree. Foreign matter, such as unburnt limestone, coke, slag, clinker, etc., is largely retained in the revolving sieve and assists in the process of breaking down the lime.

A 22 horse power motor drives the hydrator, elevator and separating device. Both coal and wood are used for burning. The Limeton Lime Company is producing a high grade product under economical conditions. The officers of the company are R. E. Herr, President, Treasurer and General Manager; O. W. Borden, Vice-President; T. M. Mussaens, Secretary and James W. Burk, Superintendent.

State Ownership Plans Killed

Both Minnesota and Wisconsin have turned down the proposition of state-owned cement plants. Wisconsin's senate on April 3rd killed a resolution having as its purpose the establishment of such a plant. The vote was 20 to 10. A similar bill was defeated at the last session by a vote of 16 to 14.

In Minnesota the Commission appointed to investigate the feasibility of a state owned cement plant advised against such a proposition. The gist of the recommendation is as follows:

"The Minnesota Cement Commission is not in a position to recommend that the state should go into the business of manufacturing cement, on the basis of information that it has in its possession at this time. . . . To ascertain the advisability of constructing a state-owned cement plant the state would have to employ expert engineers to determine the cost of production, the elements of markets, transportation, coal and other materials would have to be considered.

Probe Cement Trust

A resolution has been introduced in the state senate at Lincoln, Nebraska, calling on Attorney General Spillman to investigate an alleged cement trust. The resolution, introduced by Senators Kerr and Shallenberger, quoted a speech by Senator Jeary who declared that while the Attorney General was interested in the gas probe to "further political ambitions," he had at hand the cement trust which was "making more money from farmers than any gas combination."

Modern Material Handling Methods In the Cement Industry

Written Expressly for PIT AND QUARRY by C. H. Sonntag

Part I.

MATERIAL handling is a subject of much concern and interest to the cement industry. Mr. Sonntag is well known to the crushed stone and cement industries mainly through his work in connection with the cement plant at Cape Girardeau, Missouri. This plant is now operated by the Marquette Cement Manufacturing Company but Mr. Sonntag's connection dates back many years—during the time when the plant was operated by the Cape Girardeau Cement Company. Last year Mr. Sonntag decided to devote his time to consulting engineering in the cement and crushed stone industries.

The second part of this article will appear in the May 15th issue of Pit and Quarry. Mr. Sonntag will contribute at least one article a month for publication in Pit and Quarry on problems of importance to the cement and crushed stone industries.

—Editor.

The manufacture of Portland cement differs from the majority of large-scale factory operations in that the materials from which it is made are in almost constant movement from the time they leave the beds in which Nature placed them until they reach the storage bins for finished cement. During the late summer when shipments are extremely active and consumers are clamoring for prompt filling of their orders, even the pause in the stock-house may be for only a few hours, for most makers have learned to turn out "specification cement" as it leaves the last pulverizers, so that it may be sent out just as soon as the final check-up tests are made.

Cement manufacture is not in any sense an intermittent operation. A mill that is run at all will drive along continuously day and night, seven days a week. Shutdowns will be only those of necessity, caused by machinery breakages. The conveying system constitutes the "liaison" or connection channel between the various departments, and the majority of serious mill shut-downs are caused by the failure of some part of this conveying system. Up-to-date superintendents keep a record of the causes of lost time in their mills, and the amount of this found to be chargeable to the material handling apparatus has convinced owners and managers that money in strengthening this part of their equipment is amply repaid by the economies effected by continuous running.

As every one familiar with it knows, the Portland cement business is divided from the manufacturing viewpoint into two great subdivisions known respectively as the dry and wet processes. There are minor variations of these, and there is also a so-called semi-wet process, but the great majority of mills fall definitely into one or the other of the two classes just mentioned. Each of these presents its own peculiar problems of material handling, which will be treated separately, but it would be well to first consider getting these materials from their original resting places into the mill.

The substances from which cement is made are either hard and massive, like limestone, cement rock and shale, or soft and more or less non-coherent, as marl, clay and granulated slag. The former will most likely need to be drilled and blasted before they can be excavated. They are usually loaded into cars by power shovels, and as quarry practice is a large subject in itself, a general discussion will not be attempted here. It should be noted, however, that there is a visible tendency in cement quarries to use electric shovels and gasoline locomotives in place of the older steam equipment. An electric shovel is ready to run on the throwing of a switch. A steam shovel must have water and fuel brought to it, and must have a fireman to keep up steam. If the quarry is near enough to the mill to permit electric power transmission at a reasonable cost, the use of electric equipment will effect marked economies.

Marl as a source of Portland cement is becoming less important as time passes. The deposits are found almost exclusively in northern Ohio and Indiana, southern Michigan and Canada. They are generally covered with

water, and where this is the case they are recovered by dredges of the dipper or clam-shell type, and may be taken to the mill in cars loaded on the bank, in cars carried on scows, or directly in scows. In the latter case enough water may be added to make a slurry that can be pumped from the scow to storage basins in the mill. Each marl deposit is a problem in itself, and the method of working it must be more of an individual and special development than is usually the case in rock quarries.

Crushing House

The modern crushing plant differs strikingly from its predecessor of a few years ago. The primary breaker has a receiving opening that will admit the largest rock likely to be brought from the quarry. Such a crusher will discharge pieces in 8 or 10 inch sizes. The belt and bucket elevator that once was standard equipment in a crushing plant will not give good service in handling such coarse material, and there has been developed a slow-moving elevator with very large continuous buckets hung between two strands of long pitch steel roller chain. Such an elevator can be constructed of any reasonable length, center distances of over 100 feet being common, and because of the slow speed, wear is slight and long continuous service may be expected. It is true that such elevators are expensive in first cost, but against that should be put their long life and freedom from break-downs. They are commonly set at an angle of about 45 degrees, and so serve to convey as well as elevate.

A cement mill using rock requires that all of it be broken down to about 1½ inch size before it is fed to the pulverizers. This has brought about the introduction into the crushing plant of the swing-hammer type of machine, which will take the discharge of the primary breaker and reduce it to 1½ inch in one operation. Omission of intermediate screens and crushers has so greatly simplified the handling of material that a modern crushing lay-out will call for only two elevators—one between the first breaker and the swing-hammer mill, and the other after the latter machine. These elevators may be duplicates, so that one set of repair parts will do for both. There will be only two conveyors, both short and of the apron type, serving as feeders for the two crushers. It might even be possible to omit the first of these, though most engineers would hardly consider it good practice.

From Crusher to Mill

Circumstances will determine the nature of the transportation between crusher and mill, and the most important of these is the location of the reserve stock of crushed stone. If this is at the crusher, stone must be delivered to the mill at a fairly regular rate for the entire twenty-four hours, so that the dryers or pulverizers may have a uniform feed. On the other hand if the storage is at the mill, crushed stone may be delivered to it at a very rapid and irregular rate during the day while the crusher is running, and the reserve may be drawn upon for the night operation of the mill. If transfer from crusher to mill is necessary, it will probably be done by one of the following classes of equipment: belt conveyors, cars on surface tracks, or aerial tramway.

Belt Conveyors

When the distance the rock is to be carried is short, say not over 1000 feet, the belt conveyor is in most instances the best contrivance to use. High speeds and wide belts will permit any reasonable capacity to be attained. If the size of the rock is limited to 1½ inch, and this is fed to the belt over a screen in such a way that a bed of fine material is laid on the belt for the coarser pieces to fall on, abrasive wear of the belt will be minimized, and long life and good service will be had. A special belt with a rubber face on the carrying side to take the wear will prove a good investment.

Occasionally one sees a belt conveyor used to handle rock in sizes from 6 inch to 10 inch. The writer finds it hard to believe that such an application is good practice. These large pieces are heavy, and the edges and corners between the freshly broken surfaces are sharp, and no matter how carefully they are fed onto a belt, injury to its surface is apt to result. In cement mill practice rock of this size must always be further reduced before being dried or ground, and it ought to be possible to do this before attempting to carry it on a belt.

The idler rollers supporting belt conveyors should never be other than cylindrical. Once in a while one sees

troughing idlers made by turning a wooden or steel roller so that it is larger at the ends than at the middle, or bell-shaped ends are applied to cylindrical rolls. A little consideration will show that the surface speed at different points of such a roll will be equal only when these points have the same diameter. Points of large diameter will have high peripheral speed, and vice versa. The speed of all parts of a belt is constant. It follows that on non-cylindrical carriers slipping between belt and carrier must go on continuously at all except one or two points. The inevitable result is excessive wear of both belt and idlers. If a conveyor belt is to be troughed, it should be done by cylindrical idler pulleys arranged along the desired curve, but each rotating on its own bearings separate from all the others.

By discharging from one belt onto another the distance that material can be carried becomes quite considerable. In practice the cost of the belt, carriers and supporting structure and the power required to overcome the friction of the numerous idlers soon set an economic limit beyond which the belt conveyor must give way to the car or the aerial tram.

For many years the standard conveyor carrier has consisted of a flat-faced cast iron pulley running on a plain grease lubricated bearing. Recently improved forms have appeared, composed of pressed steel pulleys on ball bearings. The bearings of this style that the writer has seen have been neither as dust-proof nor as easily lubricated as might be, but when they are in good condition they considerably lessen the idler friction and hence the power needed to drive the conveyor. It might be assumed that such a simple device would run without attention, but in practice it is wise, if the conveyor is of any length, to have an attendant with it at all times to keep it lubricated and to see that the belt is not damaged by running to one side.

Surface Cars.

Of course where the distance is great, transportation can be only by cars or aerial tramway, and the choice usually falls on the former. But even for distances where one or more belt conveyors might be considered, the surface car may have points in its favor that are well worth thinking about. Many mills keep a switch engine of their own constantly on duty to handle empty and loaded box cars and coal cars, and perhaps also to bring in shale or clay. Possibly this locomotive would have plenty of time to handle short trains of standard hopper-bottom cars from the crusher to the mill. The added investment would then be in the cars and some extra track. In a small mill the cars would be loaded from a bin at the crusher. In a large plant there would be the added problem of reclaiming from reserve storage if this storage were at the crusher, for the large tonnage held in reserve would make bin storage too high in first cost, so that open piles on the ground might be decided upon. In such a case it would seem desirable to have the storage at the mill, and haul the rock to it as fast as it is crushed. With this arrangement only two men aside from the locomotive crew would be needed—one to load and one to empty the cars, provided they are self-clearing, as they should be. Labor to withdraw rock from storage would be needed in any case.

Aerial Tramways.

These devices have been used in two or three cement mills where the topography of the ground put any other means of transportation out of the question, and the writer has never understood why their application has not been more extensive than it has. Their length is not limited as is that of the belt conveyor, for they may be a mile or more long. If the load moves down grade it may supply all the power needed to keep the carriers in motion, while if the traffic is up hill the power needed will be roughly proportional to the actual work of lifting the load the required vertical height. Tramways have not been developed of a capacity to handle the output of our largest crushers, but they will take care of all the raw material needed by the average cement plant. They are cheap in first cost, and in operation only if properly installed in the first place. Labor would be limited to two men—one at the loading and one at the discharge end. Both loading and discharge can be made automatic, so that the attendants are really needed only when something goes wrong and to look after the lubrication. By varying the distance between carriers or the speed at which they travel the tramway may if desired be used as a direct

feeder for the dryers if they are used. It would seem that this device is deserving of more serious consideration than it has apparently had.

Reclaiming from Storage.

It is usual to provide a reserve stock of both crushed rock and clay or shale as an insurance against inclement weather, machinery breakages or Sunday shut-downs in the quarry. Rock stored in ground piles can be reclaimed either by locomotive crane, bridge crane, or a conveyor in an underground tunnel. The latter two require specially constructed storages, while the first calls for no particular equipment except a track on which the crane may operate. If soft clay is one of the materials it will be found practically impossible to make it feed into a tunnel under the pile, and one of the other two schemes must be used or the clay stored after it is dried.

The tunnel under the pile has been used for a good many years, and the conveyor is simple and not likely to get out of order. It has the disadvantage that if the pile is not restrained by walls, and takes its natural slope to the ground, only half the contents will feed to a central tunnel by gravity, so that if it is desired to use the other half, some means of dragging it to the tunnel openings must be arranged for. Retaining walls may be built, and two or three tunnels may be used instead of one, either of which increases the investment and fixed charges and the latter also complicates the conveyor equipment.

The locomotive crane and the bridge crane can be made available to more than one department of the mill so they will be discussed later.

The conveyor in the tunnel will preferably be of either the belt or drag-chain type. Either will give good service, but the drag chain is more rugged and will stand more abuse than the belt, though it is not customary to use it for very long runs on account of the excessive tension necessary in the chain. The drag idea is not novel, but its application was not usual until the development of a very heavy chain that would stand up to the work with infrequent repairs and replacements. As used in cement mills today the chain is made of cast steel, either carbon or manganese, both pitch and width being from 8 to 12 inches. Each link is cast in one piece, the connection pin passing entirely across the chain through the cross-bar of the link. This conveyor is an outgrowth of the sawdust drag used in lumber mills, but greatly strengthened to fit it for the strenuous work of the cement plant. The chain has no attached flights, and travels slowly in the bottom of a trough made commonly of white iron. Material may be carried on either the upper or lower run of the chain, the idle run being supported on rollers at intervals of six or eight feet. The chain may be covered several inches deep by the material being handled, and quite large capacities obtained in this way. The drive should be at the discharge end, but openings in the bottom of the trough permit discharge at any point. This conveyor will handle substances at a temperature of 600 or 700 degrees Fahrenheit, with entire satisfaction but it is not suitable for red-hot material because of the danger of distorting the links.

Some arrangement for feeding the rock or shale to the conveyor will be desirable. This may take the form of the table feeder, familiar to us from its introduction with the Gates ball mill, or the reciprocating feeder. Where a number of openings are to be drawn from the latter it will be found easier to install in the limited space available.

Dry Process Mills

A few plants make the mix by regulating the feeders under the rock and clay storages, and mix the two and dry them together, but the usual procedure is to dry the materials separately. On leaving the dryers it is likely that the rock and shale will be elevated to conveyors leading to storage over the mixing scales. The elevators will be of the usual type, as the service will not be particularly hard on them, but the case is otherwise with the conveyors. Dry clay or shale in sizes not larger than 1½ inch is not a difficult material to handle, and can be moved in the ordinary screw conveyor easily. Then, too, in a limestone or shale plant the latter will never be over 25 per cent of the total raw material, and may be much less, so that conveying it, while important, is not the major problem.

Rock crushed to 1½ inch size is not a nice thing to put through a screw conveyor, even when that conveyor is 16 or 18 inches in diameter. There is a tendency to pack at the hangers and cause excessive wear of the end flight of each section, and the power

required to drive a long run of conveyor will shear a good many coupling bolts. A heavy drag chain may be used for this work, and in the present state of our knowledge is probably the best solution of the problem.

Raw Grinding Department.

In the average mill the two raw materials, which have been kept separate up to this time, are now mixed in proper proportions and the mixture sent to the raw grinders, and the same problem is presented as in taking rock away from the dryers. In the past, screw conveyors have been largely used for this purpose. They are excellent mixers, but their up-keep cost in this service is high, and what is of more importance, they are the cause of considerable lost time while under repairs. In many mills the screw conveyors now in use can be replaced by drag chains with no very radical alterations, and the cost will be well repaid in lower maintenance and greater continuity of operation.

The customary lay-out will consist of a conveyor under the scales, an elevator and a conveyor over the pulverizers. These three can be replaced by a conveyor of the pivoted bucket type making entire circuit from scales to pulverizer bins, but this would be high in first cost and would call for a special lay-out of bins, scales and mills that could usually be considered only in building a new plant.

If the grinding is done in two stages there will be screw conveyors and an elevator between the preliminary and finishing mills, but the material will have been reduced to such a size that these devices will handle it very nicely, and they will also serve to take the finely ground mix to storage or to the kiln feed bins.

Kiln Feeding.

Some form of conveyor is necessary to withdraw the mix from the feed bin and deliver it to the kiln at a uniform rate, and it is doubtful if any dry process operator has solved this problem to his entire satisfaction. The mix, especially if slightly damp, will arch over the openings in the bottom of the bin and stop feeding, and about the only way to break these arches is by means of compressed air. The result is a mass that is so fluid that it will flow through every tiny crevice and will flush through the ordinary feed conveyor, while the same mix, not loosened up by air, may be quite sluggish. A short double flight screw will not stop flooding, though a very long one, 30 or 40 feet in length, is usually effective. The writer knows of a recent case where the feed conveyor runs in 12 inch pipe, and the flights were specially made somewhat large and turned down on the edge to give just a running clearance in the pipe, but this has not been in use long enough to prove or disprove its efficiency in stopping flooding.

Wet Process Mills

Plants using marl as the source of lime will receive it at the plant as a pumpable slurry or in bulk in a more or less wet condition. In the first case the shredded clay and more water if necessary may be added to the marl in agitated storage tanks, while in the latter case some mixing device such as a wet pan will be used in which the preliminary mix with clay will be made, and also enough water added to make a slurry that can be stored as just mentioned.

Wet process mills are practically limited in their choice of raw grinding machinery to ball and tube mills or to a combination of the two in one unit, and the material handling is reduced to pumping and storage in tanks provided with some form of agitator and mixer.

Pumping may be done in either of four ways: (1) by plunger pumps; (2) by centrifugal pumps; (3) by compressed air; and (4) by bucket elevators.

Plunger Pumps.

These are probably the oldest devices in use for handling slurry. Special machines have been developed for this work. They are always of the power-driven, single acting vertical type, and have very large passages and valves so as to offer the least possible resistance to the flow of the thick slurry. They work very well as long as they are in good condition, but the wear on the plungers is quite considerable, for the slurry will carry fine particles of sand which will become imbedded in the packing and cut and score the plungers so badly that leakage is soon in evidence.

Centrifugal Pumps.

For slurry handling only the simple open runner single stage type is used, not at all like the refined designs developed for handling clean water or for boiler feeding. This pump is cheap in first cost, easy to keep in operation, and may be had direct connected to a motor and mounted on the

same bed-plate. It is not self-priming, and should preferably be set so low that the slurry will always run to it by gravity. This type is cheap enough to permit installation in duplicate.

Compressed Air Pumping.

If a steel tank be located below the bottom of a slurry basin, slurry will flow into it if the proper pipe connection is made. If now a valve in this pipe be shut and compressed air be admitted to the tank, slurry will be forced out through a pipe connection in the bottom to a height limited only by the pressure of the air. This is a very simple arrangement from the mill man's standpoint, as pumping means only the manipulation of a few valves. But the system requires an expensive air compressor, and pumping stops when the compressor shuts down or breaks down, so that serious accident to this machine would put the entire raw mill out of commission. Power is used rather lavishly, as a tank of high pressure air is lost every time a tank of slurry is pumped. The tank should be set vertically, for if in the horizontal position a large part of its capacity will be lost by the accumulation of slurry that will settle and remain in the less active parts.

Bucket Elevators.

Where direct lift without much horizontal transport is desired, the bucket elevator makes a very good machine for the purpose. Chain and buckets do not differ from those used for dry material, but the casing should be practically watertight and the boot entirely so, or the foot shaft may be set in a concrete pit independent of the casing. Slurry may be carried a reasonable distance from the head of the elevator in sloping pipes or open troughs or as our mining friends call them, launders.

The second part of this article will appear in the May 15th issue of Pit and Quarry. Mr. Sonntag will discuss in this second part kiln feeding, clinker handling, stockhouses, bag handling, coal handling and general material handling in the cement industry.

Easton Car of Missouri

In order to serve more effectually that territory of the United States lying between the Mississippi River and the Rocky Mountains, the Easton Car and Construction Company has formed and incorporated, establishing headquarters in Kansas City.

Freight Loadings Decrease 5,091 Cars for One Week

Loadings of revenue freight totaled 917,284 cars in the week ended April 11, a decrease of 5,091 cars, or .5 per cent under the week before, according to the American Railway Association. Compared with the corresponding week last year the total was an increase of 36,347 cars or 4.1 per cent, but it was 29,987 cars, or 3.1 per cent, under the same week of 1923.

Loadings of merchandise and less than carload lot freight amounted to 260,760 cars, 1,494 cars under the previous week, but 7,149 cars over 1924 and 21,935 cars over 1923. Miscellaneous freight loadings were 357,705 cars, 7,967 cars under the preceding week, but 26,458 cars over last year and 12,527 cars over two years ago. Loadings of forest products aggregated 78,617 cars, 1,044 cars under the previous week, but 1,851 cars over last year and 1,274 cars in excess of 1923.

Coal loadings totaled 138,065 cars, 6,578 cars over the week before and 10,361 cars over 1924, but 44,537 cars under two years ago.

Loadings of grain and grain products, totaled 31,108 cars, 3,151 cars below the week before, 6,517 cars under 1924 and 8,222 under 1923. Livestock loadings amounted to 25,114 cars, 1,261 cars over the preceding week, but 2,654 cars under last year and 4,572 cars under two years ago.

All districts reported declines under the week before in the total loading of all commodities except the Pocahontas and Central Western. All of them, however, reported gains over the same week last year except the Central Western.

A comparison by weeks follow:

	1925	1924	1923
April 11	917,284	880,937	947,271
April 4	922,375	861,990	896,375
Mar. 28	931,395	907,389	896,735
Mar. 21	909,363	908,290	916,818
Mar. 14	924,149	916,762	904,116
Mar. 7	930,009	929,381	905,344
Feb. 28	862,910	944,514	916,624
Feb. 21	925,295	945,679	830,187
Feb. 14	902,877	935,589	816,646
Feb. 7	928,244	906,017	849,352
Jan. 31	896,055	929,623	865,314
Jan. 24	924,254	894,481	869,464
Jan. 17	932,150	894,851	864,297
Jan. 10	932,807	872,023	873,908
Jan. 3	765,727	706,292	727,246

Hand Labor in This Stone Quarry To Be Abandoned Because of Cost

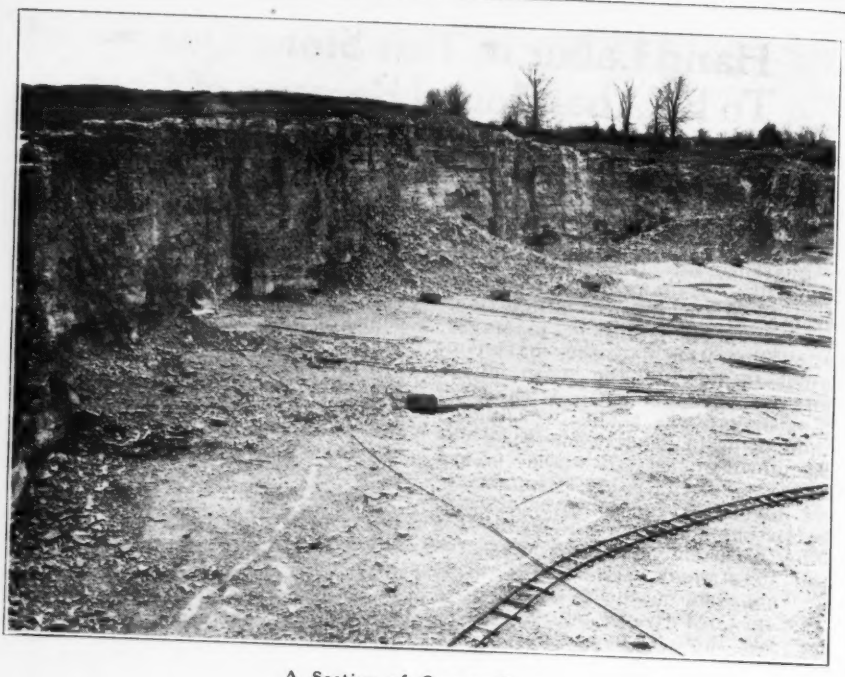
Midwest Crushed Stone Company Applies Modern Methods Plant Previously Operated by Spencer Stone Company

THE Midwest Crushed Stone Company of Indianapolis, operating quarries at Greencastle and Ridgeville, Indiana, acquired the property of the Spencer Stone Company at Spencer, Indiana, in March, 1923. Since that date they have continued to operate the plant under their own management. At the time the property was taken over it was found to be in need of many repairs and improvements. It was necessary first to do considerable stripping before a season's run could be started. An Orton Steinbrenner locomotive crane with shovel attachment was used in stripping 12 feet of overburden. The material was hauled away in Ford trucks equipped with one yard dump bodies. In this way about 200,000 tons of stone were uncovered in three months during 1923. This stone is now practically exhausted, and it is necessary to strip again.

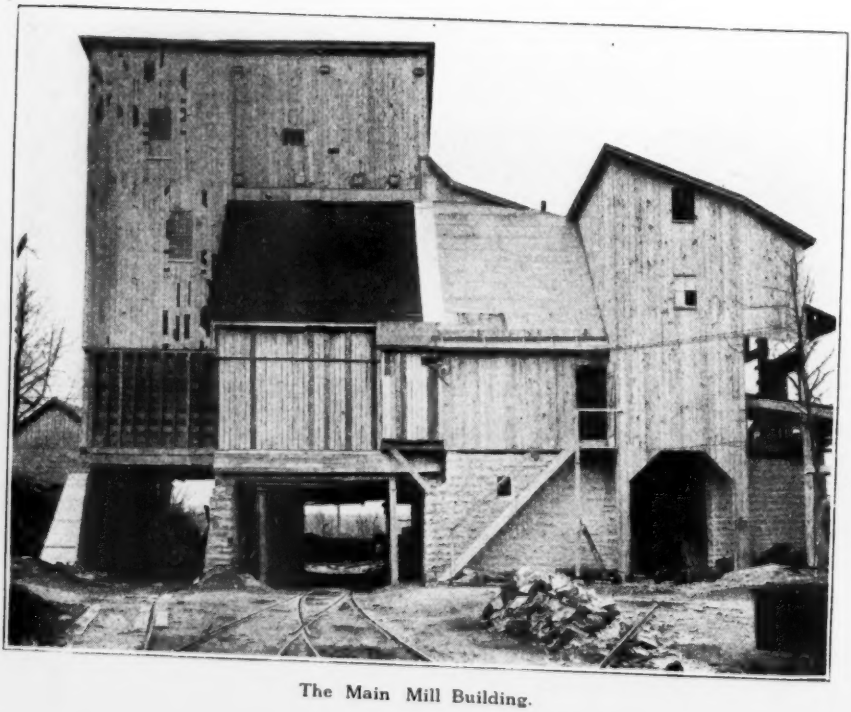
In stripping this time it will be necessary to remove about 12 feet of dirt and possibly three feet of loose seamy stone. It will probably be advisable to shoot this stone and take it up with the dirt as the expense of reclaiming would be greater than any price the stone might bring. Industrial track will be laid for this stripping, and a Marion number 40 steam shovel will load the overburden into cars to be hauled away by an 18 ton Davenport locomotive.

The blast hole method of shooting is used in the quarry. A Sanderson Cyclone drill is used in drilling to a depth of 76 feet. The shooting is done with 60 per cent Hercules 5x12 dynamite sticks, and these are ignited with Cordeau Bickford fuse. The drill holes are placed 18 to 20 feet from the face and 10 to 12 feet apart. From 18,000 to 20,000 tons of stone are shot down at one time. Ingersoll Rand hand and tripod drills are used in the quarry. The plug-

A General View Showing Incline From Quarry to Plant.



A Section of Quarry Face.



The Main Mill Building.

ging in the quarry is done with a BCR-430 type Ingersoll Rand jackhammer. In this work 35 per cent Hercules dynamite is used.

The quarry has been operated by hand labor. This method has proved very expensive as well as obsolete and inefficient. Hand loading has cost the Midwest Crushed Stone Company at this plant 17½ cents a ton. This method will be abandoned this year. Stone will be loaded by shovel into quarry cars and hauled away by locomotive.

The plant equipment consists of a number 7½ Allis Chalmers crusher, a number 6 Austin crusher, a Telsmith 5x24 foot 150 H.P. General Electric motor. The number 7½ crusher reduces the stone to about 4 inches. The discharge from this crusher is elevated to the screen. The oversize from the screens is returned to the number 6 crusher where it is reduced to about 1½ inches. The recrushed stone is again elevated to the screens. The Hummer screen is used in screening out the agricultural limestone for which this company has a steady and growing market. Six sizes of stone are produced from 4 inch down to 8 mesh screenings. The plant capacity at the present time is 900 tons of stone per ten hours.

The Midwest Crushed Stone Company crushed and sold 138,000 tons of stone at this plant last year. There is at the present time about 35,000 tons of agricultural limestone in storage. The capacity of the plant has been increased, but present market conditions indicate that it may not be necessary to produce more stone than last year.

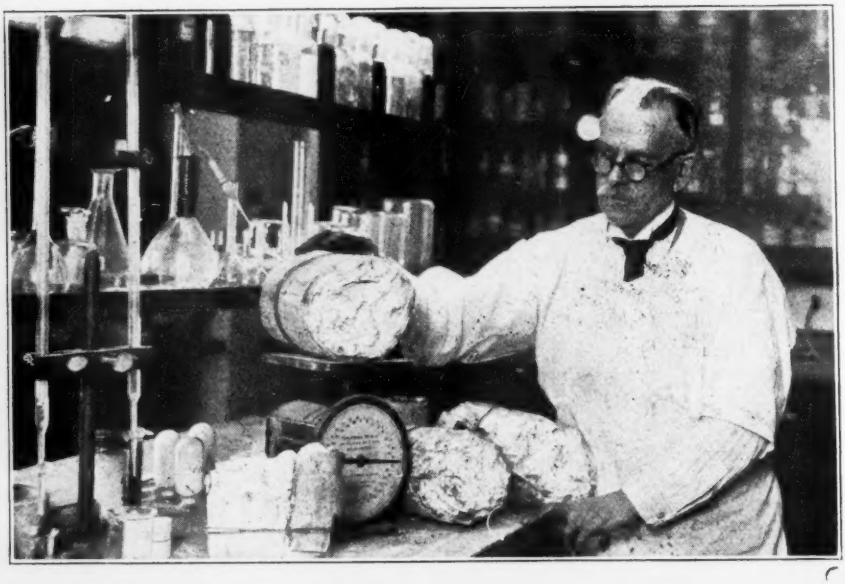
The crushed stone plant at Greencastle, Indiana, is another example of the Midwest Crushed Stone Company's methods. In this case conditions are more favorable. The plant was completely rebuilt to replace one that burned down in the spring of 1924. The bins and crusher buildings are built of steel with pure corrugated zinc roofs and siding. There is storage for 100,000 tons of stone in the Greencastle plant. There are 6 bins each of about 80 tons capacity at the Spencer plant and 8 bins each with a capacity of 150 tons at the Greencastle plant. The capacity of the Greencastle plant is about 2000 tons of stone per 10 hour day. A detailed description of the Greencastle plant operated by this company appeared in the July, 1924, number of Pit and Quarry.

The officers of the Midwest Crushed Stone Company are: C. C. Cartwright, President; L. R. Cartwright, Vice President; E. R. Cartwright, Treasurer; and C. F. Meyer, Jr., Secretary. Mr. Taylor is in charge of the Greencastle plant and Mr. Pickett is in charge of the Spencer plant.

View Showing Trestle Out to Waste Dump.

Tusks of Prehistoric Animals Found In Sand Pit

Dr. H. J. Warsap, chemist for the Blue Diamond Company, at Sixteenth and Alameda streets, Los Angeles, is shown examining the tusks of prehistoric animals found in the 80-foot sand pit excavation of the company's grounds. The sections of the tusks were very soft, owing to the water seepage through the sand in which they were found. The little section, 10 inches long and 15 inches in diameter, weighed 15 pounds. Scientists from the local museum are expected to investigate the findings. A general view of the sand pit where the bones were found is shown. Workers have continually come across the tusks in their diggings.



Heat Disposition and Temperature Determination in Lime Kilns

Written Expressly for PIT AND QUARRY by Charles Longenecker

THE heating kilns will include both the vertical for burning lime and the rotary for a like purpose. Before discussing the temperature attached in any type of kiln investigation will be made as to the thermal conditions which obtain.

The time has come in this country when more attention must be paid to securing greater economies in all our heating operations. The lime kiln, for instance, has been developed from a very crudely constructed shaft following practice which like the kiln was equally crude. The development has been according to conditions and as warranted by economic factors. These factors are changing and this fact must be recognized. We are approaching the status which now obtains abroad. It may be years before we reach a standing as regards fuel which now exists abroad, but there high fuel cost is counterbalanced by low labor cost. Here conditions are the reverse. If we can utilize cheaper fuels and those near at hand, we can naturally produce our product at a lower cost.

Dependence must mostly be placed on coal as the fuel, and the only consideration will be as to how to burn it most economically. Where the ash of the coal contaminates the lime and hence is injurious, means must be taken to reduce this evil to a minimum. This fact eliminates "mixed feeding" in some vertical kilns. In European practice the installation of a gas producer integral with the kiln is common practice. This gives a high efficiency, as the common loss of from 20 per cent to 30 per cent in the gas producer, due to loss through the heat of gasification, is largely eliminated as the sensible heat of the gas is utilized. A pure lime is secured as the dust in the gases settles out in the gas passages. Not only is a lime of higher quality obtained, but at the same time less labor is required as the producer requires less attention taking into consideration the labor required to handle coal and dispose of the ash. In hand fired practice the loss of carbon in the ash will run as high as 40 per cent. In a producer it should not run over 15 per cent. This gas too can be burned with less excess air thereby affording a greater volume in the kiln for the CO_2 driven off the stone. Closer regulation of the burning conditions is also possible when a gas is employed, as the flow of gas can be adjusted within very close limits by dampers for the gas and blast gates for the air. The heat distribution is more regular as compared with hand firing due to the fact that as many as six burners can be equally spaced around the periphery of the kiln instead of two as is usual in the hand fired kiln. A kiln having a diameter of 6 feet 6 inches inside brick lining requires a heat penetration of 3 feet 3 inches from inside the lining. This can be done more easily with gas whose pressure is under control. Naturally too great a pressure cannot be built up on the kiln, otherwise there will be danger of "recarbonation."

Whatever the method of firing the kiln there are factors which are common to all fuels. The ideal condition in a kiln obtains when the stone is neither underburned nor overburned. This condition will be reached when the temperature is uniform throughout every cross sectional area of the kiln. If the stone is of a uniform size, the passage of the gases through the interstices will be at a uniform velocity and the heat transfer will be equal throughout any cross sectional area. This presumption is based on the introduction of the hot gases so that a greater flow at the sides is prevented. The resistance of the stone to the passage of the gases is such that the center of the kiln is not reached until some distance above the point at which the gases enter. The iron blast furnace operates under a disadvantage similar to the lime kiln. The blast furnace with a closed top necessitates the charging of the ore through a center opening in the top. When the ore is dumped in from the bucket, the large lumps roll to the outer circumference while the "fines" remain in the center. This affords an easier passage for the hot gases at the sides. The lime kiln has the advantage that distribution of the stone can be more easily and more satisfactorily accom-

plished except in those kilns modeled after the blast furnace.

To insure a uniform output in quality and at the same time to maintain economical operation uniform and constant operating conditions must be observed. This is true of any heating operation whether it be burning lime, melting iron or refining copper. The rotary lime kiln illustrates this point. If the stone is all of a uniform and correct size, the draft uniform, the fuel introduced and burned uniformly, and the rotation of the kiln uniform, a product uniform in quality will be discharged. Naturally the physical qualities and moisture content of the stone must be constant. The necessity for an absolute control of the variables entering into any operation based on the application of heat is not appreciated today as it will be in the future.

How the heat from the coal is utilized is best shown by tracing the disposition of the heat. The temperature reached in the burning zone will be on an average 2400° F. The specific heat of limestone is .22. The temperature at which dissociation takes place is close to 1650° F. The heat then required by one pound of stone will be:

Heat to raise stone to dissociation point (1650°—60°)×.22	=350 B.T.U.
Heat to dissociate CO_2 (Found by experiment)	=772 B.T.U.
Heat to raise resulting lime to 2400°F (2400°—1590°)×.22	=178 B.T.U.
Total	1300 B.T.U.

In practice one pound of stone requires 1/3 of a pound of coal to burn it. With a coal of 13000 B.T.U. content 4333 B.T.U.'s will be required to furnish the heat. This is 3.3 times the theoretical amount of coal. There then remains a difference between the theoretical and the actual of 4333—1300=3033 B.T.U. to account for.

This heat is lost as follows:

1—As sensible heat in the gases passing out of the kiln.
2—As sensible heat in the lime drawn from the kiln.
3—Radiation from the kiln shell.
4—As combustible in the ash.

The gases passing from the kiln will leave at a temperature approximately 450° F. The gas from the burning of the coal, with the excess air, will be augmented in passing through the kiln by the CO_2 from the stone together with any moisture there may be in the stone. In wet weather this latter item may be considerable. The loss of heat in the waste gases will approximate 20 per cent or 867 B.T.U. for each 1/3 pound of coal.

The heat in the lime drawn from the kiln will depend altogether on the effectiveness of the cooling. If the hopper is lined the lime will contain a very appreciable amount of heat; while if unlined or if means are provided to cool the lime in preheating of air, the loss will be within a few per cent.

Radiation from the kiln shell will be in all probability approximately 40 per cent to 45 per cent in the natural draft kiln. In this kiln the gases must be forced out by the heat contained. The draft will not be strong comparatively speaking and the kiln will heat up so that the walls will conduct much heat to the shell. A good insulation would reduce the loss from this source very greatly. Too great an insulation will cause the brick lining to become excessively hot and may increase maintenance cost excessively.

The remaining item combustible in the ash is largely, in the hand fired kiln, a question of the "human factor" and the design of the grate, etc. In hand fired practice the loss of combustible will frequently run from 25 per cent to 30 per cent. Below 10 per cent is good practice and is rarely found. This item can be reduced by careful attention and supervision. There is another feature which demands attention in this connection and that is the quality of coal burned.

There is no doubt as to the feasibility of reclaiming a large portion of the heat which is contained in the gases leaving the kiln. This can be accomplished by installing waste heat boilers, air preheaters or using the gases to preheat the stone. Which method to adopt will depend on the individual plant requirements. Whether any one of these methods, or none, will be warranted by economic conditions is also a problem for the individual plant. The additional expense to confine the gases so that they can be employed in any one of the three methods must be returned in a lessened cost of unit of output. Waste heat boilers would only be warranted in a plant where power cannot be purchased at a reasonable figure or in an isolated plant of some size. The utilization of the heat in the gases from

preheating the air for burning the coal appears to possess the greatest possibilities. From a mechanical point of view the installation of an air preheater would require the closing of the top of the kiln and the erection of the equipment. Air preheaters have been perfected to the point where results can be guaranteed. In order not to increase the CO_2 pressure in the kiln it might be necessary to install an induced fan. This of course requires some financial outlay, and the return must be forthcoming to justify such an addition.

A reference to the figures previously mentioned indicates that 2600 B.T.U.'s are lost for every pound of coal burned. There is therefore a possibility of a very worth while saving by heating the air. With a fuel consumption of 600 pounds of coal per ton of stone, the saving at a 50 per cent return would be 60 pounds of coal per ton of limestone. The rotary kiln offers much more attractive opportunities for heat recovery as the gases leaving can be much more easily handled mechanically. The temperature at the discharge end will approximate 1200° F. and at this temperature waste heat boilers are attractive. On the vertical kiln with an exit temperature of 450° F. to 500° F. the air preheater possesses greater attractiveness. With the rotary kiln the power feature is more significant. Sixteen to twenty horse power is required to rotate the kiln. When powdered coal is burned, it is estimated that 40 per cent of the ash of the coal will be taken up with the lime. This addition may or may not be prohibitive depending on the quality of lime desired.

In measuring the temperature of kilns there are several factors to be considered. It is much easier to determine the temperature of the hot gases than of the material itself. This is usually the case in furnaces of all types. Another feature in taking the temperature of any large chamber heated throughout is to secure a representative reading.

The vertical lime kiln having a diameter of some six feet affords opportunity for a wide variation of temperature over a cross sectional area. To get a representative temperature reading at the top of the kiln at least nine readings should be taken. Four readings should be made at the circumference at points 90° apart. Four more should be taken on the same radii but at points half way from the center to the circumference. The ninth measurement will be at the center. From these readings not only will the average temperature be obtained but any unequal flow of gas will be indicated and, if serious, steps can be taken to remedy it. These measurements can be secured by a "base metal" thermocouple such as is sold by any of the prominent pyrometer manufacturers. A mercury thermometer can also be used where the temperatures do not exceed 1000° F. Such a thermometer suspended on a rod provides a comparatively inexpensive method of accomplishing the desired result.

It is a hard task to get a correct temperature reading below the top of the kiln. True it is that openings can be made in the shell and brickwork and a thermocouple inserted and a reading taken. But the question is what does this reading represent? It will all depend on the surroundings at the end of the thermocouple in the furnace. If this is a gas, it will naturally be the temperature of the gas but there will be no way of telling whether the thermocouple is touching the stone or not. Another and a more serious condition arises when the stone, or brick, radiates any appreciable amount of heat. It is apparent that if the temperature of the gases is desired, any heat radiated from the stone or brick will give a false reading.

Where there is an opening large enough, the optical pyrometer can be employed. In using this instrument care must be exercised that no film of gases of any nature pass in front of the instrument. The atmosphere must be clear. The optical pyrometer can be used to advantage for measuring temperatures in the rotary kiln. In this case it should be sighted on the lining or on the material. If the coal or oil or gas be shut off for a short space of time, a reading can be secured through a clear atmosphere. Such a reading will of course give the temperature of the object sighted upon. If in the rotary kiln it is desired to secure the temperature of the gases, a pyrometer with thermocouple should be used. For high temperatures the couple should be such as made by various manufacturers for high temperature measurement. There have been methods devised by means of which temperatures can be taken with a thermocouple in a rotary kiln but these devices are complicated and

are not reliable. As mentioned previously, where the temperature of a gas is desired, radiation from any surface will give a reading in excess of the true one. This should be remembered in taking gas measurement from a rotary kiln. The correct result can be found by passing the gas through a passage in which radiation will be nil. Comparative readings can readily be obtained by inserting a pyrometer in the passage way at the end of the rotary kiln. Such a pyrometer will indicate any changes in temperature which take place.

To determine the temperature of the interior of a vertical kiln Seger bones could be charged with the stone and then collected when discharged with the lime. In this way a close approximation to the actual temperature reached could be determined. This method is not practical for continuous temperature determination as there would be some difficulty finding the cones, but for research it could be employed. For close control of the conditions in any type of kiln a CO_2 recorder and draft gauge can be used to advantage.

U. S. Production of Bauxite

The production of bauxite in the United States in 1924 was 346,553 long tons, valued at $2,131,908, a decrease of 34 per cent in quantity and 32 per cent in value as compared with the domestic production in 1923, according to a statement issued by the Department of the Interior, prepared by James M. Hill, of the Geological Survey.

Bauxite produced in the United States in 1923 and 1924, in long tons:

Year	Domestic product'n	Imports	Exports*
1923 ...	522,690	119,020	78,560
1924 ...	346,553	201,974	77,065

*Largely bauxite concentrates.

The production of bauxite in the Arkansas field was 326,616 long tons in 1924, a decrease of 167,264 tons as compared with 1923. The eastern field decreased its output over 8,000 tons, the production in 1924 being 19,937 tons from Georgia and Tennessee. No bauxite was produced in Alabama in 1924. The imports of bauxite in 1924 were 201,974 tons, an increase of about 70 per cent as compared with 1923, most of which came from the Guianas, South America, through some French and Dalmatian bauxite was received.

Hill Pump Company Sold

Announcement is made by the Dean Hill Pump Company that the Hill Pump and Turbine Works, formerly a division of the Midwest Engine Corporation, was acquired by the first named concern November 10, 1924. The new owners, who have back of them half a century of experience in pump manufacture, state that the former organization of men will remain unchanged. The company recently opened a New York office at 149 Broadway where New York sales and service will be handled.

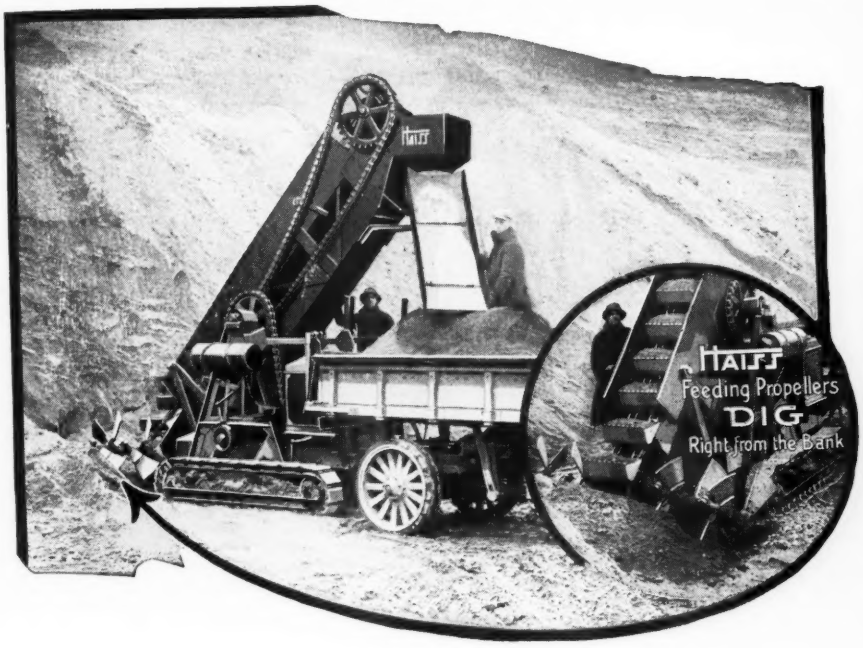
Dean Hill centrifugal pumps are all designed by Mr. Schleyer and the steam turbines by Mr. Wait. Both engineers have been with the plant for over seven years.

Hill pumps and Wait turbines represent over 32 years of experience. The horizontal centrifugal pump line consists of single and multi-stages, built in both the volute and diffuser types, the latter lending itself particularly to high efficiencies. The vertical centrifugal deep well pumps are designed for any size well above six inches and are said to be one of the most efficient and dependable pumps for delivering water from the ground.

The steam turbines are of the single stage type and are very substantially built, especially for the severe service incidental with pumping machinery. With the Dean Hill turbine driven pumping units both the pump and turbine are designed and manufactured under one roof, thus relieving the purchaser of all the responsibility incidental to its successful operation.

Mayor J. Q. Staples, of Wiona, Miss., and the council are planning elaborate street work in that town, in paving, etc. Natchez, Miss., also has an extensive street paving program. Birmingham and Jefferson counties, Ala., have many miles of road work ready to start. Arkadelphia, Ark., and Hot Springs are doing some paving, and Laurel, Miss., Dyersburg, Tenn. and other cities hard surface road work. Several large gravel contracts in the tri-states for roads have been let this month.

Foster and Creighton, of Nashville, Tenn., are active at their quarries in the Rockwood, Alabama section, at Russellville, Ala. The quarries have been worked since 1850. The product is handled by many Nashville dealers.



Sure, It Will Pay For Itself

It is self-feeding, digs its way into the bank and feeds the sand and gravel into its buckets.

It is self-crowding—with a slow speed drive that keeps it pushing into the bank so that every bucket digs a full load.

It is mechanically superior—37 H. P. motor, enclosed transmission and clutches running in oil, creeper tread mounting, simple design.

A HAISS Truck Loader is the ideal machine for cutting the cost of loading bank gravel into trucks. It will pay for itself on the small job—getting out 40-50 yards a day, through a 4 or 5 months' season.

You dig right from the bank. Your labor is one machine operator only. You speed up your trucks, make more trips per day, and more profit per trip.

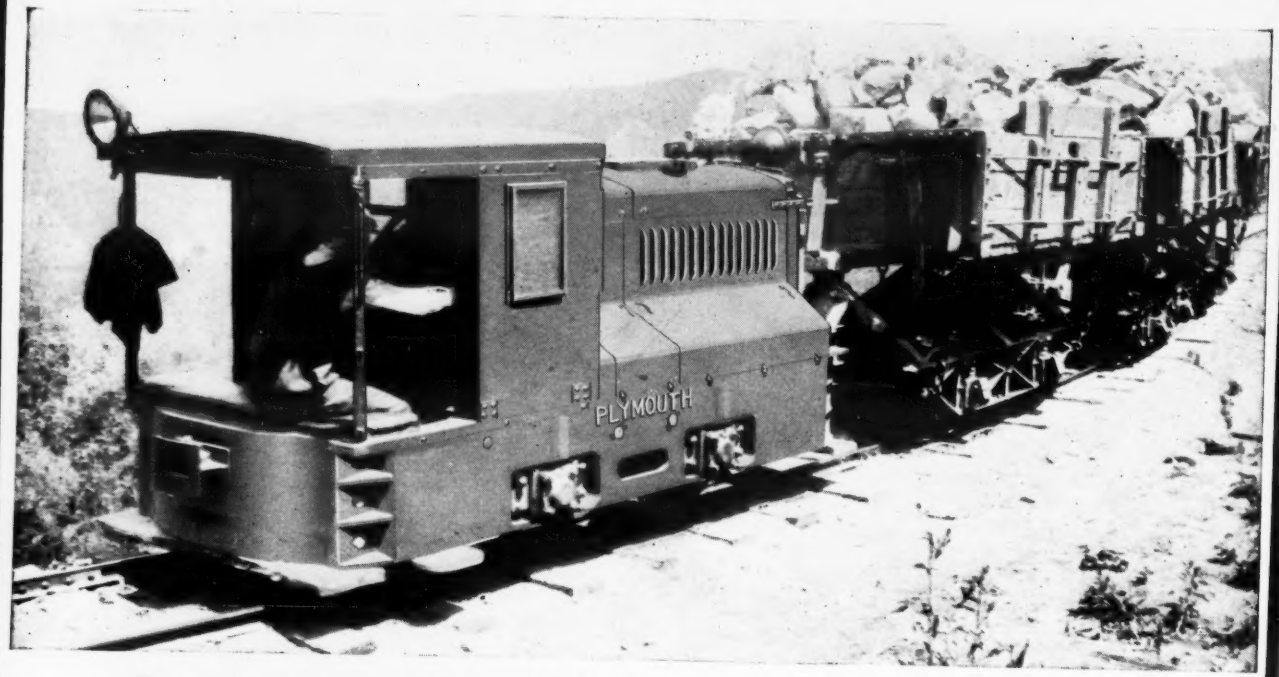
The Haiss Loader is, beyond question, a factor which has made many operations more profitable than ever before. There are hundreds in use—and just as many satisfied users.

INVESTIGATE! ASK FOR CATALOG 523

Manufacturer of
THE GEORGE HAISS MFG. CO. INC
Established 1892
Truck and Wagon Loaders
Portable Belt Conveyors
Clam Shell Buckets
Mail Handling Equipment

142nd St. and Rider Ave., New York, N. Y.

Representatives Throughout the World
Cable Address "Coalhoist" New York—"Western Union 5 Letter Edition" Code



Plymouth 7-Ton Locomotive Owned by Old Mission Portland Cement Co., San Francisco

Working Continuously on 5 1-2% Grade

To build a gasoline locomotive, and have it [illegible] hours a day, six days a week, for two years, on a 5½ percent grade, is proof of both design and construction.

Plymouth Locomotives, like Old Hampshire

OLD MISSION PORTLAND CEMENT CO.
SAN FRANCISCO
[illegible], Calif.
March 6, 1925

The Fate-Root-Heath Co.,
Plymouth, Ohio

To build a gasoline locomotive, and have it work continuously for nine hours a day, six days a week, for two years, on a 5½ percent grade, is proof of both design and construction.

Plymouth Locomotives, like Old Hampshire Bond are built "a little better than seems necessary." It is this additional strength and ruggedness that makes them stand up under the unusual demand.

When you select your haulage equipment remember the Plymouth is tried and proven. There is no other industrial locomotive so capable, and none so universally demanded in Quarry and Sand and Gravel service.

Write for Catalog and Bulletins "C" and "F".

THE FATE-ROOT-HEATH COMPANY
Plymouth Locomotive Works
PLYMOUTH, OHIO

OLD MISSION PORTLAND CEMENT CO.
SAN FRANCISCO
San Juan, Lucerne, Calif.
March 6, 1925

The Fate-Root-Heath Co.,
Plymouth, Ohio

Gentlemen:

It has now been two years since we purchased and placed in service one of your geared, seven ton, Plymouth Locomotives.

This Locomotive has been in service nine hours per day—six days per week—during this entire period; working continuously on a 5½ percent grade.

We are certainly well pleased with the performance of this Plymouth machine, and should our needs demand it, I would not hesitate in recommending the Plymouth for our future requirements.

Very truly yours,
OLD MISSION PORTLAND CEMENT CO.
(Signed) F. F. Parker,
Superintendent

PLYMOUTH
Gasoline Locomotives

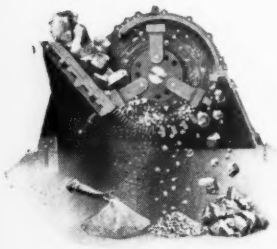
More Accurate Size Control!

"Makes Best Prepared Stone State Highway Commission Has Used."

INDIANA STATE FARM, Greencastle, Ind.

"No Crusher Could Do Better Work than Our No. 2 Jumbo."

BOARD OF ROADS, Floyd County, Ga.



Cross sectional view of Williams hammer crusher showing how larger or smaller grates make any size product desired. Also note how patented front end can be adjusted toward or away from the hammers.

State and County Institutions are finding Williams hammer crushers their best crushing investment not only because they handle larger rock, but also because of better size control. For macadam they can be adjusted to make less "fines" than jaw or gyratory crushers. For water bound roads the use of a finer crusher grate delivers just the proper percentage of "fines" necessary for binding.

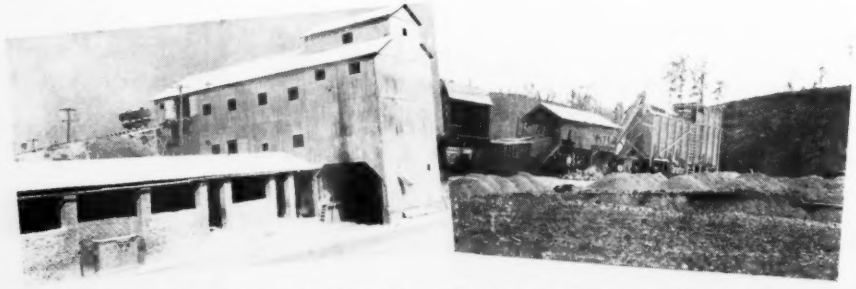
First cost is 50% less because one Williams usually does the same work as two crushers of any other type. At the Indiana State Farm, one Williams replaced a No. 3 and No. 5 gyratory. If you contemplate crusher purchases write for our figures and list of nearby users to substantiate them.

WILLIAMS PATENT CRUSHER & PULV. CO.
802 St. Louis Ave. St. Louis, Mo.

Chicago
37 West Van Buren St.

New York
15 Park Row

San Francisco
415 5th Street



Crushing plants of Indiana State Farm, Greencastle, Ind., and Board of Roads and Revenue, Floyd County, Ga.

Williams

PATENT CRUSHERS GRINDERS • SHREDDERS

Connecticut Feldspar Plant Solves a Transportation Problem

Tidewater Feldspar Company Replaces Mill Destroyed by Fire Interesting Procedure From Baggings to Loading of Feldspar

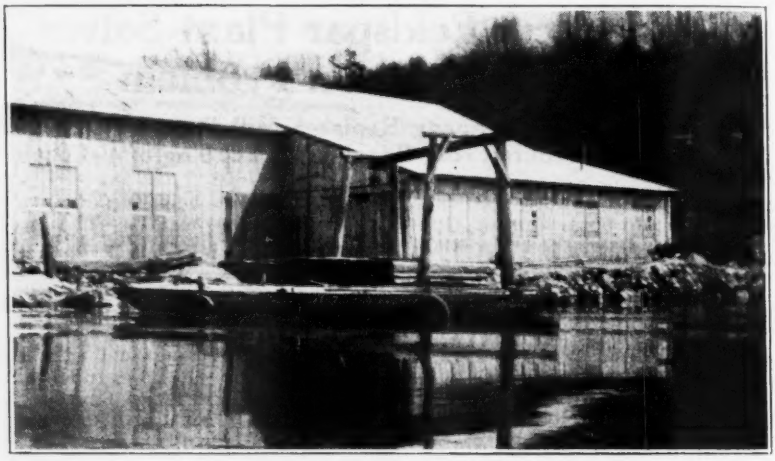
FELDSPAR is a double silicate of aluminum and potassium or aluminum and more of the other alkali earths as sodium, calcium, barium, etc. Magnesium is generally always absent. The general characteristics of the various species of the feldspar group include first crystallization in the monoclinic of trinclinic system—the crystals of the different species resemble each other in angle, general habit, and method of twining; second, cleavage in two similar directions parallel to the base; third hardness between 6 and 6.5; fourth, specific gravity varying between 2.5 and 2.9; fifth, color of white or pale shade of yellow, red or green; sixth, composition, silicates of aluminum with either potassium, sodium, calcium and occasionally barium. The feldspar produced by the Tidewater Feldspar Company is a potassium feldspar of the triclinic species. Their product is prepared for the glass, pottery and sanitary trade. It ranges in fineness from 90 to 140 mesh.

Fire destroyed the mill of the Tidewater Feldspar Company at Rock Landing, Connecticut in June, 124. For about four years previous this company had been producing feldspar on its property. The product has been noted for its excellent qualities. Construction was started on the new mill shortly after the fire and operations were resumed last December.

Diamond drilling last summer in the floors of the two openings in use showed excellent spar to a depth of 25 feet in an area 200x100 feet. The present workings, 50 feet above this level, will furnish spar for several years before it becomes necessary to work the lower level.

Ingersoll Rand drills supplied with air by Bury compressors are used in the quarry. These compressors are driven by electric motors. The Central Connecticut Power and Light Company who have a Hydro Electric Plant three miles to the East on Salmon River have run a power line over to the property. The Ingersoll Rand jack hammers drill holes in the bench ranging in depth from 10 to 12 feet. The rock blown down is loaded into dump trucks and transported over a public road at a low cost to the mill.

View of Mill and Surrounding Territory.

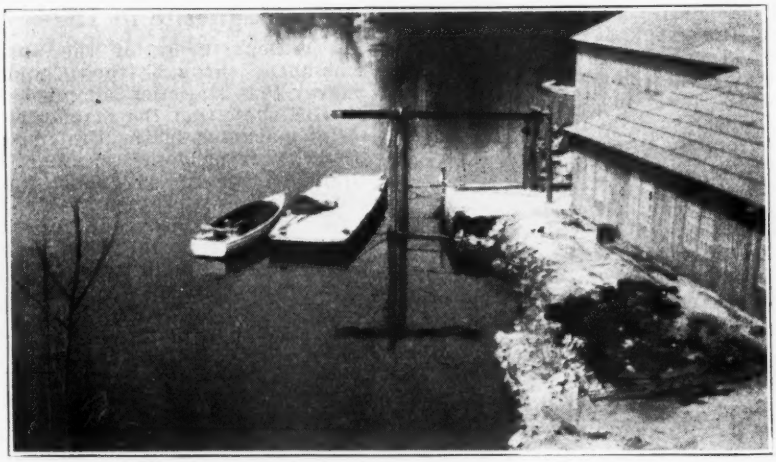


The Mill and Dock for Loading Barges

The mill is on the east side of the Connecticut River with dock facilities and water 30 feet deep. The deposit covers eight acres of excellent feldspar and surrounds the mill. The company has another piece of property 3,500 feet from the mill of 60 acres where the quarries now being worked are located. This development is on a hillside and natural drainage takes care of any accumulation of water. The main structure is 50x100 feet with an extension 25x45 feet giving a floor area of 6125 square feet. The floor is concrete. The mill equipment consists of one Reliance crusher, one set of Sturtevant rolls, one Hardinge conical mill, two Hardinge cylindrical mills, six screens of the Trommer type, seven general electric motors, seven storage bins, etc.

The crude feldspar as it comes from the quarry is dumped into bins. Material as it is needed is taken from these bins and delivered to the Reliance crusher. From this crusher the material goes to either one of two rotary dryers where all moisture is removed. Any fine dirt or other clinging foreign matter is also removed in this drying process. Care

View of Quarry.



Another View Showing Dock.

in the drying process eliminates trouble in pulverizing. The material is then placed in another storage bin after drying. From this storage bin the material is taken to the screening plant. That discharge from the screens goes to the Hardinge conical mill while the rejections are sent to the Sturtevant rolls for further reduction. The fines from the Hardinge mill passes to the intermittent or batch mills while the tailings are returned to the Hardinge mill. There are six screens in all which are used to produce the desired size of granules. The motors for driving the mill machinery range from 5 to 25 H. P.

The prepared feldspar is packed in 100 pound bags. Twenty bags are placed as fast as they are filled on 3x5 feet four wheel trucks which take the material to the edge of the dock. Here the trucks are lowered by a Yale and Town electric hoist onto barges. The barges in service carry five trucks each of one ton capacity across the river to the Tidewater siding on the New Yerk, New Haven and Hartford Railroad. On the other side of the river each truck has to be taken up a 20 per cent incline by means of an overhead 10-inch eye beam and deposited on the

The Mill Showing Entrance for Trucks.

loading platform. From this platform the truck is rolled into the railroad car before it is unloaded. A Fairbanks Morse gas engine is used to haul these trucks up this twenty per cent incline. This operation from packing bags to the loading of the cars is continuous as feldspar is very seldom stored in bags in the mill. This method of delivering the bagged material to railroad cars is rather interesting. By locating the mill on the bank of the river it has been possible to bring the material from the quarry to the mill and then take it from the mill to the railroad cars with a minimum of handling and at the least cost under the conditions. There is generally much more handling and longer hauls in feldspar plants.

The products prepared are principally glazing feldspar for enameling purposes. This is ground to a fineness of 90 mesh and fines. It is suitable for sanitary fixtures, granite ware, stove enamel and other porcelain enameling purposes. A considerable tonnage of coarser material is produced from 3 to 30 mesh which is used for building purposes and poultry grit. The mill can quite easily produce two cars of glazing feldspar daily and a larger tonnage of coarser products. Fifteen men are normally required in the quarry and mill. This includes six men who handle shipping.

A BLASTING FEAT

An unusual feat was accomplished recently at the quarry of the Dittlinger Lime Company of New Braunfels, Texas, when 96 holes were drilled and shot in the short space of three and one-half hours. The holes were well-drilled to an average depth of 60 feet, and then loaded with 31,050 pounds of dynamite made into six by fourteen inch cartridges. The result of this quickly prepared blast was 97,286 pounds of well broken rock. The success of the shot was attributed to the use of the large cartridges.

Ambrose Changes Office

The Ambrose Sand and Gravel Company has discontinued its office at Denison, Texas, and has established a main office at Bonham, Texas. This change is in line with the company's policy to give the best possible service to its customers.

Magnesite in 1924

The Department of the Interior announces through the Geological Survey that statistics compiled by J. M. Hill show that the magnesite material marketed in the United States in 1924 from domestic mines was equivalent to 100,413 short tons of crude magnesite, valued at $789,728, a decrease of 32 per cent in quantity and 28 per cent in value as compared with the quantity marketed in 1923. The State of Washington produced in 1924, 52,876 tons, which was more than half the total output for the year. A low value on the crude uncalcined rock is reported by Washington operators. The value of California crude magnesite produced in 1924, which amounted to 47,537 tons, is estimated at $13.67 a ton, but as all the product is sold calcined or dead-burned, the value thus fixed is entirely arbitrary.

There were fewer producers of magnesite in California in 1924 than in 1923, and the industry throughout the State was rather dormant during the summer but revived toward the end of the year. The industry in Washington was also working on a smaller scale because of the imports of magnesite. Until freight rates or import tariffs, or both, are further adjusted, domestic producers will probably not be warranted in greatly increasing their output.

Magnesite (expressed as crude) supply in the United States, 1919-24, in short tons:

	Domestic production	Imports	Total	Proportion of consumption supplied by	
				Domestic	Foreign
1919....	156,226	25,321	181,547	86	14
1920....	303,767	63,110	366,877	83	17
1921....	47,904	65,569	113,473	42	58
1922....	55,790	217,861	273,651	26	74
1923....	147,250	151,092	298,342	49	51
1924....	100,413	129,576	229,989	44	56

NEW BROWN HOIST NAMES

Announcement is made by The Brown Hoisting Machinery Company of Cleveland, Ohio, regarding new appointments in its sales organization as follows: J. P. Case, sales manager; J. F. Poland, manager of Chicago office; E. W. Taylor, manager of Pittsburgh office. In addition to his duties as sales manager, J. P. Case will also be in charge of Cleveland Division Sales.

Automobile and Truck Liability

Written Expressly for PIT AND QUARRY by Dwight Ingram*

AN Illinois jury just awarded damages of $25,000 against a Chicago corporation. The cause was an automobile accident of three years ago in which the corporation's car struck and crippled a pedestrian.

A peaceful citizen was driving his car on a through street when a Ford driver deliberately ran into him. It was a "frame-up." The innocent man had the right of way under the law and the other man was entirely at fault. Yet so carefully had a "crooked" lawyer planned the situation that a small boy riding in the Ford suffered a "nervous shock" and was able to collect $300 damages from an insurance company that would rather close the case than risk a long drawn out court battle.

These two true stories are quite modern events. Neither would have been possible in 1905, and they would have been unlikely in 1915. Big damage awards and professional skill in attempting to rob the insurance companies are largely post-war developments. The automobile itself is new as a large scale factor in life; so it is natural that automobile insurance is also new. It is the young giant of the underwriting field. Its rules and rates have been scientifically made and are becoming stabilized, but it is still in process of developing because all of its records and statistics are being revised by our accumulating experience, and anyone who formed his ideas of what was correct insurance on a truck or car five years ago is likely to find that he has inadequate protection according to present practice.

As is true of all new fields of insurance, the automobile "game" has been overrun with cheap insurance. It is loaded with mutuals, reciprocals and motor clubs, some of which doubtless are legitimate and sound underwriting institutions, but the bulk of which are local organizations which lack the nation-wide spread of losses necessary to a healthy and long life. The business is so fast being stabilized however, that the weaker non-standard organizations are dropping out of the field, and it is consequently becoming easier for the buyer of insurance to make sure of the safety of his coverage.

When all is said and done, automobile insurance impresses the average person as centering around three questions: Can I safely buy insurance for less than the tariff rate? What is the most I could be "stuck for" if I hit someone and a jury awarded damages against me? How much is my car worth?

The first question arises from the human craving to get something for nothing. Whether it is machinery, merchandise or insurance that you buy, you usually get just about the quality you pay for; but there is this difference, that with insurance no policy is worth more than a worthless piece of paper unless it is the safest in the market.

There are at least seven different kinds of automobile insurance: Fire and transportation, theft, collision, liability for injuries to others, liability for damaging the property of others, windstorm and explosion, and breakage of the glass in the car. The number of different coverages seems to complicate the buying of insurance. As a matter of fact it simplifies it. The various features are of different degrees of importance to different people. Each automobile owner thus can design an insurance policy to fit his own belief or need, covering only those items which he considers vital and carrying the lesser risks himself.

These many kinds of insurance fall naturally into two general classes. Some of them cover damage to one's own car from major accidents, such as fire or collision. It is fairly easy to measure the importance of these to the car owner. He knows that such accidents may cost him anything from a few dollars up to the full value of his car, and he usually has a definite idea of how much he is willing to pay to insure any of these risks.

The second class of insurance is that covering the legal liability for injuring the person or property of others. This is a distinctly negative sort of protection—"you don't get anything out of it." Yet it is by far the most vital part of the underwriting field. You can gamble on your

*Engineer—Moore, Case Lyman and Hubbard.

own collision risk if you wish because the most you can lose is your car; but with this legal liability there is no limit. You can lose as much as a jury will award against you, even if it sends you to bankruptcy.

A few years ago we thought we had liability insurance nailed down tight by court decisions. But within the past twelve months courts of many states have been opening up new angles and have been allowing claims that used to be considered beyond the law. Two states have gone so far as to give a wife damages for injuries due to her husband's driving, contradicting the common law that there is no difference in interest between the pair. And most of the states have upset the well-established principle that a guest or passenger in a car accepts all the risks of the driver, for it is now not uncommon for a passenger to collect for injuries from the driver of the car he is riding in. These new developments not only have a tendency to raise rates, but they also upset our old ideas and make the insurance profession collect new statistical data as a new basis for the business.

There is never a question as to whether liability insurance should be carried, since no one can afford to assume his own risk of a big damage claim or the pestering of a shyster lawyer. The only question is how much to carry. The basic policy will pay all expenses of investigating and defending claims, all outlay for immediate surgical relief, and in the case of personal injuries or death will pay damages up to $5,000 for one individual or $10,000 for the total of all persons injured in a single accident. This is commonly called the "5-10" limit. It was invented years ago when automobiles were rare and when the value of the dollar was more than it is now. Through ignorance or inertia many car owners are still carrying this small policy. Admitting that this is not enough, what is the most economical safe basis for liability insurance? For the liability for property damage it would seem that $1,000 or $2,000 for pleasure cars and from $2,000 to $5,000 for trucks operating in cities should be adequate. For the liability for personal injuries there are two reasonable plans. One is to carry "full insurance," that is, limits that are higher than the largest damage award on record in your state. This would mean limits of at least $20,000/$40,000 and possibly $25,000/$50,000 or even $100,000/$300,000. The cost of this extra limit is not much, the "20/40" policy costing only a third more than the basic "5/10" and the "100/300" costing twice as much as the "5/10."

There is another theory, however, that is logical and that leads to such intermediate limits as $10,000/$20,000 or $15,000/$30,000. The buyer of one of these policies recognizes that many claims are worth more than $5,000 and that if an insurance company is faced with one of these under a "5/10" policy it will certainly go into court, for it could never effect a settlement below the limit of the policy and there is always a chance of favorable action by the jury. If, however, the insurance company has ten or fifteen thousand of its own money at risk it will be more anxious to compromise the claim, and except in very unusual cases will be able to get a settlement out of court.

The owner of a car is not the only one who may be held liable for automobile accidents. The responsibility of the driver is equally obvious, and he is usually covered automatically by standard policies. In addition, there may be other interests, such as those of employer and employee with a car used on business, regardless of which party is the owner. Both of these interests can be named in the policy without extra charge and given the full benefit of the insurance. It frequently happens that employees use their own cars on company business, thus creating a contingent liability on the part of the employer, and the employer is not satisfied with the employee's insurance or feels that he wants some protection in his own hands. In this case the employer can get a special contingent liability policy, costing only about half the full rate, and covering only the employer's interest.

Automobile accidents bring up one form of liability that is seldom recognized. Many firms have their hauling done by independent contractors and pay a flat sum for the use of trucks and drivers. The renter of such trucks very positively has a legal liability for accidents,

the proportion of his liability depending on the degree of control which he has over the routing and handling of the truck. It is important, therefore, to make it a condition of hiring a hauling contractor that the truck owner must carry insurance which covers your interest adequately as well as his own. In this connection you should also require that the contractor carry workmen's compensation or employers' liability insurance covering his chauffeurs, for otherwise you may be held liable for their injuries, and in some states may even have to include their wages as part of your own pay roll in figuring the premium for compensation insurance.

The most widely carried form of automobile insurance is fire and transportation, combining the risks of fire and of damage while being transported on a common carrier. One reason for the universality of this insurance is that the fire risk is obvious. But nowadays the principal reason is probably that most automobiles are bought on a part time payment plan and the mortgagee insists on protecting his interest by insurance.

The most perplexing problems in automobile fire insurance are how much insurance to carry and how much can be collected in event of loss. The principle is just the same as for fire insurance on your buildings or machinery. The company will pay the cost of your car, new, at current list price, minus a depreciation charge equal to the actual wear and tear for the time and miles it has been in service. Put in another way this is what it would cost the insurance company to go into the second hand market and find a car of like age and then send it to the repair shop for replacement and paint so as to put it in condition you claim your car was in at the time of loss. Insurance companies always settle losses in cash, but the limit of this settlement should be not much more than the cost of replacing a car with another of like kind and condition.

The fact that the amount of loss is thus limited and that the premium is fixed by charging a certain rate per $100 on the estimated value of the car has led to the most unsatisfactory feature of automobile fire insurance. If I own a car that today is worth $2,000 and eleven months from now will only be worth $1,500, how much insurance should I carry for a year? If I carry $2,000 I shall be paying most of the year on a value that does not exist and which I cannot collect. If I limit my policy to $1,500 I am out of pocket in case of loss during the first months. Approximate fairness is achieved by taking, say, $1,800, so that I should not lose much at the outset and will not pay much excess premium for the last months. Since many car owners misunderstand or dislike this feature of insurance, some companies have tried to sell a "valued" policy, under which, for instance, if a car is insured for $2,000 the owner collects $2,000 whether it was worth that much or not at the time of loss. While this form of policy is attractive and is probably fair to the majority of people, it led to great abuse. "Moral hazard" crept in. There are thousands of persons who are willing to lose their cars just as soon as the insurance amounts to more than the actual value. This form, therefore, has been abandoned by practically all of the substantial companies because, in spite of its simplicity, sound public policy prevents the issuing of policies that encourage dishonesty.

Just recently a new development has taken place that, if experience bears out the theory, will finally dispose of this difficulty over the amount of insurance. This new development is the "actual value" or "no amount" policy. The contract contains no reference to any given number of dollars, and merely says that the owner will be paid the actual sound value of his car at the time of loss, this amount to be determined by impartial appraisers if the insured and the adjuster are unable to agree. This apparently gives the honest man all that he is entitled to in the event of loss without overcharging him or making him estimate the maximum value of his car in advance. Since the actual value policy is still more or less in an experimental stage, it can not yet be used for insurance on trucks. The companies are trying to build up their statistics on cars of the pleasure type first before extending this plan universally. To figure the premium under the actual value policy, one takes the regular manual rate per $100 according to the make and age

of the car and multiplies this by the following percentages of the manufacturer's current list price:

Age of Car	LIST PRICE Under $1499	$1500 to $3499	Over $3500
New	List price, F. O. B. factory		
6 to 18 mos.	70%	75%	80%
18 to 30 mos.	50%	55%	65%
Over 30 mos.	35%	35%	50%

For those readers who are still carrying the old form of policy these percentages are interesting as giving an inkling of the approximate value of all cars. Of course, they are not necessarily correct for all models or all individuals, but they represent the general average accurately.

The importance of theft insurance, like the rate, varies usually according to the population of the community in which the car is operated. All the underwriting and rating principles are virtually the same as those given above for fire insurance. You should always read the theft clause in your policy carefully, because you will usually find that tools and repair equipment are excluded from coverage, and in many localities there are special "jokers" or exclusions that should be studied and avoided if possible.

The least known form of automobile insurance is "tornado." It is added to a fire policy by endorsement at the rate of fifteen cents per $100. It actually covers a great deal more than tornado, including all direct damage from windstorm, hail, earthquake, water (from external source) and explosion (except within the tires or engine). If it were better known it probably would be very widely carried, because at the low rate it is one of the best "buys" in the market.

What is commonly called collision insurance means protection from damage done to one's own car by collision. It is cheap in rural districts where it is hardly needed and in cities where the risk is worth protecting its cost is almost prohibitive. This is a case where the insurance man can hardly give advice. His only service can be to quote the rate and permit the car owner to judge whether he is willing to carry his own risk or prefers to make certain of the limit of his expense by carrying insurance.

Glass breakage, while widely sold, is not commercially important, because the most one can lose is the fifty or so dollars necessary to replace the windows in a sedan or limousine. It serves a useful purpose on private pleasure cars where the rate is only $7.50 on a closed model and where the insurance company will usually replace a broken glass more promptly than an individual can and will relieve the car owner of trouble and vexation in making the replacement.

Leaving out of account cut rates, which usually mean unsafe protection, there are two ways that rates can be reduced. One way is through special policy forms, and the other is for superior protection against loss.

Of the special forms the newest and most valuable is a liability, property damage and collision policy (covering all or any of these risks) which permits a pro rata refund if the car insured is to be laid up for at least sixty consecutive days between November first and May first. In the past it was necessary to suspend insurance by paying the "short rate" penalty. In view of the seasonal nature of the pit and quarry industries it is probable that most trucks used in them are eligible for this reduction in rate, and it is equally probable that news of improved policy forms filters through the country so slowly that many of our readers are still carrying their insurance on the old basis.

The second method of reducing rates is through protecting your car against loss. The recognized protections are of two sorts. An approved wheel or transmission lock will reduce the theft rate by 15 per cent if installed by the dealer or owner, or by 20 per cent if installed at the factory when the car is built. An approved front bumper will reduce collision rates 10 per cent and a rear bumper will bring a credit of 2½ per cent.

These features of protection are doubly valuable, of course, because they both cut down the chance of loss and reduce the cost of insurance. There is one big element of protection, however, that we have not yet been able to analyze in the rating schedule. That is the human element of carefulness and respect for the lives and property of others. Practically every automobile accident is the fault of somebody, and common sense and courtesy on the road are needed to safeguard our property, to cut down the cost of insurance, and to reduce the list of 14,000 persons killed annually.

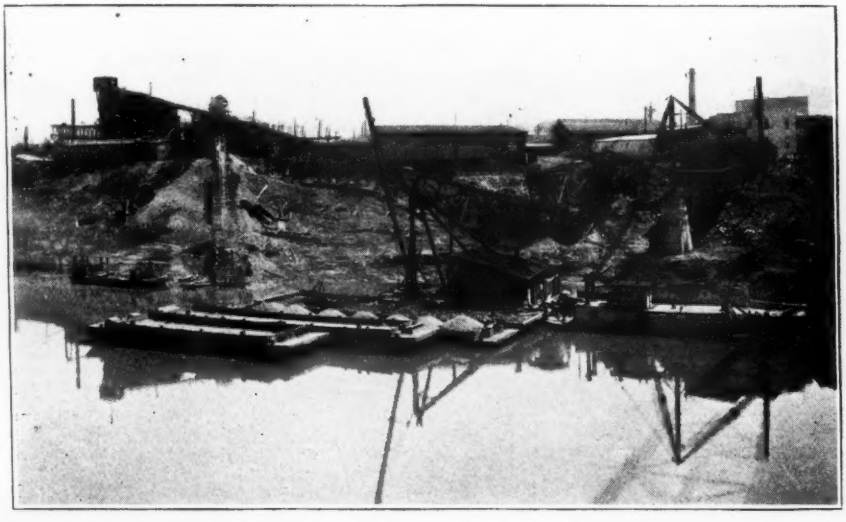
Transferring From Old to New Plant Accomplished in Two Days

Portsmouth Sand and Gravel Company Operates on Scioto River Completes New Plant Without Materially Affecting Production

STARTING in business in 1917 with one gasoline tow boat, six barges, a derrick boat and the bins shown in one of the illustrations, the Portsmouth Sand and Gravel Company of Portsmouth, Ohio, gradually increased its sales until today it finds a ready market for the daily production of 1500 tons which is the capacity of the new plant. The river plant at present consists of three gasoline tow boats, fifteen barges and a derrick.

It became necessary to rebuild in the spring of 1924. As it was possible and advantageous to change the location of the landing and the bins, the construction work for the new plant was accomplished without materially interfering with the production of the old plant. The new ten ton all steel American derrick was erected on a concrete pier on the bank of the river and a little to the right and back of the old derrick. This is clearly shown in one of the illustrations. A 10x12 three drum American hoist and a 60 H.P. Stanwood boiler have been purchased to operate the new derrick. It was necessary to shut down only two days to change operations from the old to the new plant.

The material is produced on the Scioto river about two miles from Portsmouth. The material is pumped by the dredge boat using a ten inch Amsco pump. The material is elevated to the screens and distributed from there to the different barges. The finished product is then towed to the landing and unloaded by means of the American derrick into a charging hopper. From there it is transported to the bins by means of a tram car and cable. In the little house on top of the bins there is a new 8¼x10 inch American single drum engine. From the bins the material can be loaded either into railroad cars or trucks and wagons. During the operating season all of the surplus will be dumped into other tram cars and transported out over the trestle and dumped, preparatory for winter use. This storage trestle starts at a height of twenty-two feet and reaches a height of



Unloading Dock. Plant in Distance—Note New Position of Hoist.

forty feet at its extreme end. It is three hundred seventy-five feet long and has a capacity of 40,000 tons. This storage is re-handled into railroad cars by means of an Erie crane, and into trucks and wagons by means of electrically driven Jeffrey wagon loaders. The company has recently built a hard surfaced road into the plant which is shown in one of the illustrations.

The capacity of the old plant was one thousand tons per day, and the present plant is designed to produce fifteen hundred tons per day. The new plant was designed and constructed under the supervision of Mr. Chas. I. King. The change from the old to the new plant required a shutdown of only two days. While it cost more to build the plant in this manner, as far as actual cost was concerned, it was much more economical than to shut down the old plant and rebuild it.

The officers of the company are G. S. Monroe, President; C. I. King, Vice President and Superintendent; and F. C. Fuller, Secretary and Treasurer.

Lapeer Appointment

It is announced that C. B. Harvey, formerly Branch Manager of the Philadelphia Territory for the complete line of Lapeer Semi-Trailers, has been appointed Distributor for this same territory.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,530,193. Screening machine, Henry S. Montgomery, Riverside, Cal.

1,530,478. Safety device for bucket conveyors. Axel Carlson, Chicago, Ill.

1,530,595. Mining.-machine. Charles E. Davis, Chicago, Ill., assignor to Goodman Mfg. Co., same place.

1,531,715. Excavator and conveyor. Joseph L. Potter, Indianapolis, Ind.

1,531,856. Crusher. Edward H. Frickey, St. Louis, Mo., assignor to Dixie Machinery Mfg. Co., same place.

1,532,074. Mining machine. Ellis Plumley, Ceredo, W. Va.

1,532,742. Rock crusher. Alvah D. Hadsel. San Francisco, Cal.

1,532,775. Excavating shovel. John W. Page, Chicago, Ill.

1,532,812. Automatic release for tramway buckets. Frederick W. Grice, St. Louis, Mo., assignor to Broderick & Bascom Rope Co., same place.

Bins and Conveying Trestle From Dock.

Some Interesting Production Data On a Small Gravel Plant

ORGANIZED primarily to provide materials for the Municipal Construction Company, Broome County Sand and Gravel Company of Binghamton, New York, started the erection of its plant on April 24, 1924. The plant was completed and in full operation on June 16, 1924. The Municipal Construction Company, who build pavements in the city of Binghamton, had to find some means of insuring a supply of sand and gravel at all times.

The deposit selected necessitated stripping from 12 to 16 feet. The face of the bank is 22 feet high. The gravel obtained is a hard field stone used almost exclusively for concrete pavement work. There is very little clay mixed with the sand and gravel in the bank. Due to the hardness of the material it has been necessary to keep two men on the bank. It has also been necessary to blast a good deal to get the face down. About 55 percent of the material excavated is below the ⅜-inch size. About 15 per cent of the gravel excavated has to be crushed. The largest boulders encountered are about 7 inches across. The proportion of fine material becomes greater, and the digging goes deeper.

A Godfrey dragline and a ¾ Green bucket driven by a 40 H. P. motor brings the material into the plant. A belt conveyor will be added to the equipment after the first 250 feet are taken care of. The dragline will then be moved up to the bank. The material as it comes from the pit is dumped into an auxiliary bin equipped with Telsmith plate feeder which feeds the material to a 2-inch bar grizzly. Under regular operating conditions there are two men in the gravel bank to take care of the bucket and to assist in knocking apart the large masses of sand and gravel. Another man operates the hoist and a boy is employed to signal him.

All material over 2 inches goes to a number 7A Telsmith jaw crusher. The discharge from this crusher is carried by a 57-foot Telsmith bucket elevator to the top of the screening plant. Here the bucket discharges into a Telsmith revolving screen where it is washed by a spray from a 2-inch pipe line connected with the city water supply line under a 60 pound pressure.

The first four-foot section of this screen has no openings. The next two 3-foot sections have one inch holes through which the fine material drops to to a vibrating screen beneath. Washed sand and gravel are here secured when desired by plugging the vibrating screen. The sand and gravel are separated by the same spray, before mentioned. The material larger than one inch passes to the fourth section of the screen. This section is a 4-foot heavy duty screen with openings 2½ inches in diameter. Any material too large to pass through these holes travels on down to the end of the screen where it drops into a metal tailing chute and is returned to the crusher for reduction.

The sand from the vibrating screen flows through troughs to the sand settling tank where it is washed under a steady stream of water. This is a Telsmith sand and settling tank and it discharges the sand automatically after a sufficient weight of sand has settled to a sand silo. There are two silos for storage. These are just below the screening equipment. The silo used for sand storage has a capacity of 50 cubic yards and the other which is used for the gravel has a capacity of 80 cubic yards. There is storage space between the two silos for small size gravel.

The power plant consists of one 40 H. P. motor for operating the dragline, one 30 H. P. motor for operating the feeder, crusher and circular screens, and a 2 H. P. motor for the vibrating screen. Each unit is entirely independent of the other.

One man is employed to watch the plate feeder, crusher, elevator and screening equipment and to see that material is prevented from getting into the machinery. Another man is employed to keep all moving parts well lubricated. As a rule there are two men who assist in loading the trucks for hauling sand and gravel. A superintendent completes

the normal operating force. The average working day the past year was 11 hours, and the production averaged 125 cubic yards a day. The plant has produced as much as 200 yards a day working 15 hours. The production is governed by the capacity of the hoist and dragline, and if a greater production is necessary, a larger size bucket and hoist will have to be installed. From July 23, 1924 until August 22, 1924 the production amounted to 4,756 cubic yards. The total production from May until December amounted to 14,786 cubic yards. The following tabulation of operating costs shows that the total cost of operation was $1.07 per cubic yard of gravel produced.

These cost figures, of course, will be very different for 1925. They can be bettered in many instances. They show clearly what was done under the conditions which have been explained. The labor cost which is 52 per cent is entirely too high. The was probably due to the extra work necessary the first year of operating. The gravel is a hard field stone, and blasting was also necessary. The power cost, however, is quite reasonable. The repair allowance is not high, and when we stop to think that it was not all used, it is very creditable. This cost affects a more serious one than would result from shutdown. The conditions in this plant are not typical by any means, but could you reduce these costs from the conditions as explained? Any comments from readers will be welcomed by the editor.

Cost of Operating Complete Plant Equipment.

Cost of Operating Complete Plant Equipment:	
Depreciation—$8,255.00÷ 4 years	$ 2,063.75
Average interest at 6%— 5-4×$8,255.00×.06	309.56
Repair allowance per year	400.00
Oil for lubrication	78.92
Power—20,320 K. W. H.	795.06
Water cost—1,006,300 cu. ft. ×5c per 100 cu. ft.	503.15
Labor for stripping and preparing gravel bed	3,423.00
Operating labor	8,224.00
Total cost for season (one year)	$15,797.44
Total cost per cubic yard produced: $15,797.44÷14,786	$ 1.07
Power consumed per cubic yard produced— 137 K. W. H.:	
Power cost per cubic yard	$ .0538
Oil cost per cubic yard	.0053
Operating labor per cubic yard	.5562
Water cost per cubic yard	.0340

There is a ready market for all material produced. Deliveries are made in 4 and 5 ton trucks. The officers of the Broome County Sand and Gravel Company are F. B. Davis, President; D. G. Davis, Vice-President and Treasurer; and J. J. Cox, Secretary. E. E. Sweet is plant manager.

Ohio Macadam Association Meets

THE annual meeting of the Ohio Macadam Association was held in Columbus, Ohio, Thursday and Friday, April 23rd and 24th. The business sessions were held on Thursday afternoon and Friday morning. The officers and executive committees were re-elected. Stone sizing, rolling and drainage were discussed with the decision to give more attention to these problems. Mr. H. S. Perry, maintenance engineer of the Ohio State Highway Department, addressed the group on Thursday afternoon.

A dinner was held at the Atlantic Club on Thursday evening. A very well balanced program and a good dinner served to make this evening a great success. Mr. L. A. Boulay, Ohio State Highway Directory and Mr. G. F. Schlessinger, Chief Engineer of the Ohio State Highway Department, gave very interesting and instructive talks. Entertainment was furnished by the famous Ohio State Penitentiary Colored Quartet during dinner. Mr. Hugh Diamond was another feature of the after dinner program. Everyone seemed keyed to the occasion as everything was a great success. Mr. Sandles as toastmaster proved a real director of the festivities as well as a humorous toastmaster.

The officers of the Ohio Macadam Association are E. E. Evans, President, Toledo, Ohio; Harry H. Brandon, 1st Vice-President, Piqua, Ohio; G. H. Faist, 2nd Vice-President, Toledo, Ohio; A. P. Sandles, Secretary, Columbus, Ohio; and W. J. Keever, Treasurer, Columbus, Ohio. The Executive Committee consisted of E. E. Evans, Toledo, Whitehouse Stone Company; H. M. Sharp, Toledo, France Stone Company; Harry Brandon. Piqua, Ohio, Marble Company; W. J. Keever, Columbus, Marble Cliff Quarries; O. A. Brand, Cleveland, The Barrett Company.

Portland Cement Statistics, March, 1925

The following tables, prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on the reports of producers of Portland cement. The March, 1925, totals include estimates for two plants. March production exceeds that for all corresponding months; shipments for March were exceeded slightly in the corresponding month in 1923, and stocks were the highest ever recorded.

Production, shipments, and stocks of finished Portland cement, by districts, in March, 1924 and 1925, and stocks in February, 1925, in barrels.

Commercial District	Production March		Shipments March		Stocks at end of March		Stocks at end of February 1925a
	1924	1925	1924	1925	1924	1925	
Eastern Pa. N. J. & Md.	3,087,000	3,054,000	2,425,000	2,758,000	4,729,000	5,042,000	4,746,000
New York	460,000	484,000	272,000	445.000	1,258,000	1,272,000	1,233,000
Ohio, Western Pa. & W. Va.	863,000	816,000	661,000	776,000	1,936,000	2,017,000	1,977,000
Michigan	510,000	566,000	429,000	428,000	952,000	1,299,000	1,161,000
Wis. b, Ill., Ind. & Ky.	1,438,000	1,406,000	1,264,000	1,214,000	2,954,000	3,739,000	3,547,000
Va., Tenn., Ala. & Ga.	837,000	1,064,000	799,000	1,048,000	797,000	706,000	689,000
Eastern Mo., Ia., Minn. & S. Dak. c	872,000	887,000	952,000	864,000	2,788,000	3,271,000	3,248,000
Western Mo., Neb., Kan. & Okla.	618,000	867,000	580,000	803,000	1,265,000	1,562,000	1,498,000
Texas	346,000	422,000	351,000	422,000	396,000	342,000	343,000
Colo. & Utah	104,000	101,000	122,000	168,000	211,000	304,000	372,000
Calif.	978,000	1,128,000	908,000	1,082,000	370,000	514,000	468,000
Ore., Wash., & Mont.	257,000	239,000	232,000	271,000	533,000	376,000	407,000
	10,370,000	11,034,000	8,995,000	10,279,000	18,189,000	20,444,000	19,689,000

a Revised. b Began producing and shipping June, 1924. c Began producing December, 1924, and shipping January, 1925.

Stocks of clinker, or unground cement, at the mills at the end of March, 1925, amounted to about 9,969,000 barrels compared with 8,497,000 barrels (revised) at the beginning of the month.

Production, shipments, and stocks of finished Portland cement, by months, in 1924 and 1925, in barrels.

Month	Production		Shipments		Stocks at end of month	
	1924	1925	1924	1925	1924	1925
January	8,788,000	a8,856,000	5,210,000	a5,162,000	14,155,000	17,656,000
February	8,588,000	8,255,000	5,933,000	6,015,000	16,815,000	a19,689,000
March	10,370,000	11,034,000	8,995,000	10,279,000	18,189,000	20,444,000
1st quarter	27,746,000	28,145,000	20,138,000	21,456,000	.....	.....
April	11,726,000	.....	12,771,000	.....	17,159,000	.....
May	13,777,000	.....	14,551,000	.....	16,403,000	.....
June	13,538,000	.....	15,036,000	.....	14,903,000	.....
2nd quarter	39,041,000	.....	42,358,000	.....	.....	.....
July	14,029,000	.....	16,614,000	.....	12,319,000	.....
August	15,128,000	.....	16,855,000	.....	10,666,000	.....
September	14,519,000	.....	16,827,000	.....	8,404,000	.....
3rd quarter	43,676,000	.....	50,296,000	.....	.....	.....
October	14,820,000	.....	17,160,000	.....	6,073,000	.....
November	13,141,000	.....	10,289,000	.....	8,928,000	.....
December	10,435,000	.....	5,506,000	.....	13,913,000	.....
4th quarter	38,396,000	.....	32,955,000	.....	.....	.....
	148,859,000	.....	145,747,000	.....	.....	.....

a Revised.

Distribution of Cement

The following figures show shipments from Portland cement mills distributed among the States to which cement was shipped during the year 1924 and in January, 1925. Portland cement shipped from mills into States, 1924 and January, 1925, in barrels a.

Shipped to	January 1925	January	February	March	April	May	June	July-Dec.	Year
		1924							
Alabama	85,410	81,010	141,946	166,154	162,471	129,432	115,416	1,075,456	1,871,885
Alaska	132	0	0	132	231	637	132	5.172	6,304
Arizona	34,370	14,185	27,700	25,659	30,146	33,469	31,126	227,650	389,935
Arkansas	41,376	60,791	54,340	82,059	105,078	75,258	89,507	632,271	1,099,304
California	988,883	856,997	757,383	850,536	899,357	1,044,824	954,751	5,408,885	10,772,733
Colorado	42,425	35,905	65,752	58,747	111,833	141,894	140,995	779,367	1,334,493
Connecticut	34,810	50,230	38,283	73,917	143,013	166,717	181,858	922,003	1,576,021
Delaware	5,786	8,431	10,088	15,035	38,393	42,874	34,413	234,994	384,228
District of Columbia	37,285	32,480	43,695	51,768	55,800	51,807	60,307	422,289	718,146
Florida	265,463	124,981	154,556	157,704	140,291	170,110	148,144	1,260,050	2,155,836
Georgia	93,062	80,789	75,087	104,100	114,026	117,426	113,412	801,636	1,406,476
Hawaii	417	8,182	6,947	2,953	5,478	1,979	944	14,104	40,587
Idaho	2,598	16,193	20,885	16,502	30,538	28,199	20,583	129,242	262,142
Illinois	463,388	397,878	547,057	962,510	1,366,987	1,421,534	1,311,151	7,302,538	13,309,655
Indiana	139,782	126,203	214,900	283,594	454,111	523,774	556,814	3,332,754	5,492,150
Iowa	53,044	51,542	87,144	146,692	254,796	421,523	393,866	1,782,784	3,138,347
Kansas	33,588	46,443	88,298	124,379	248,942	247,164	194,394	1,179,278	2,128,898
Kentucky	52,013	33,644	51,025	103,672	156,403	145,624	157,555	1,079,115	1,727,038
Louisiana	75,992	97,861	91,162	110,922	140,357	106,977	100,299	608,374	1,255,952
Maine	4,837	10,447	10,751	22,975	34,998	45,512	49,013	212,396	386,092
Maryland	47,635	53,641	67,471	131,737	163,161	157,933	192,865	1,217,185	1,983,993
Massachusetts	113,101	106,833	98,888	188,117	309,111	364,354	372,620	1,912,371	3,352,294
Michigan	190,905	203,148	229,929	424,546	655,933	989,217	1,133,346	5,699,679	9,335,798
Minnesota	59,395	61,434	141,008	212,160	240,635	404,999	451,614	1,726,311	3,238,161
Mississippi	29,867	25,907	29,194	28,800	41,698	48,772	38,886	293,944	507,201
Missouri	115,141	75,714	134,634	201,370	392,769	391,946	290,852	2,441,963	3,929,248
Montana	5,334	4,261	6,443	10,033	23,446	28,421	22,106	107,831	202,541
Nebraska	31,832	47,874	49,306	78,210	153,517	154,977	132,394	880,614	1,496,892
Nevada	2,492	1,335	4,251	6,258	7,625	8,480	11,463	51,537	90,949
New Hampshire	9,419	11,482	15,734	27,155	35,556	37,609	39,026	211,355	377,917
New Jersey	157,612	229,051	194,146	373,059	537,307	593,922	682,058	3,735,581	6,345,124
New Mexico	7,911	7,796	16,129	16,007	24,154	37,588	27,893	107,077	236,644
New York	400,896	562,858	518,381	1,043,786	1,558,728	1,710,784	1,986,895	9,900,870	17,282,302
North Carolina	79,817	86,661	120,775	161,171	232,887	319,454	278,936	1,646,924	2,846,808
North Dakota	1,380	1,958	3,277	15,741	25,531	29,414	45,337	149,096	270,354
Ohio	259,628	249,298	317,151	501,408	752,723	863,045	958,245	5,559,708	9,201,578
Oklahoma	58,872	97,193	147,337	162,654	269,777	264,611	189,119	1,071,008	2,201,699
Oregon	54,117	33,227	63,985	90,932	120,593	113,812	122,893	660,230	1,205,672
Pennsylvania	288,916	389,298	387,651	641,390	954,720	1,093,389	1,298,303	8,186,078	12,950,829
Porto Rico	0	0	0	0	0	0	5,186	1,500	6,686
Rhode Island	15,668	18,385	17,657	30,219	56,400	73,437	73,286	342,960	612,344
South Carolina	46,840	38,077	43,033	49,767	49,837	51,285	47,118	292,255	571,372
South Dakota	4,331	5,610	18,052	36,289	37,602	49,995	54,540	270,066	472,154
Tennessee	69,669	63,721	69,912	104,162	147,706	155,684	129,124	920,683	1,590,992
Texas	260,540	237,761	231,256	295,361	389,892	359,570	344,403	1,985,944	3,844,187
Utah	3,794	8,378	20,603	30,921	45,073	62,439	53,956	208,260	429,630
Vermont	3,129	21,778	10,833	13,614	23,082	28,991	72,169	166,679	337,146
Virginia	54,445	85,440	78,029	141,142	179,862	156,109	118,672	926,699	1,685,953
Washington	85,969	102,917	81,153	153,249	167,640	192,570	275,028	858,791	1,831,348
West Virginia	45,912	49,066	54,328	72,567	147,927	149,396	215,505	974,461	1,663,250
Wisconsin	113,396	58,334	136,899	239,493	377,659	474,104	524,846	2,545,709	4,357,044
Wyoming	3,492	6,881	11,266	13,079	22,017	40,153	46,734	188,091	328,221
Unspecified	15,964	54,183	51,524	55,950	69,520	139,036	67,442	246,943	684,598
	5,092,090	5,133,692	5,857,234	8,910,357	12,707,337	14,462,230	14,957,540	82,898,761	144,927,151
Foreign countries	69,910	76,308	75,766	84,643	63,663	88,770	78,460	352,239	819,849
Total shipped from cement plants	5,162,000	5,210,000	5,933,000	8,995,000	12,771,000	14,551,000	15,036,000	83,251,000	145,747,000

a Includes estimated distribution of shipments from three plants for January to June, and for October to December; from five plants for July, and from four plants for August and September, 1924, and for four plants for January, 1925.

ESTIMATES OF PRODUCTION, SHIPMENTS, VALUE, AND STOCKS OF FINISHED PORTLAND CEMENT IN 1924, BY STATES

(Subject to revision).

State	Active plants	Production Barrels	Shipments Barrels	Shipments Value	Stocks Dec. 31, Barrels
Alabama	5	5,541,000	5,543,000	$ 9,091,000	146,000
California	10	11,615,000	11,502,000	25,649,000	470,000
Illinois	4	7,005,000	6,956,000	12,243,000	691,000
Iowa	5	5,624,000	4,882,000	8,983,000	1,695,000
Kansas	7	5,894,000	5,817,000	10,122,000	867,000
Michigan	15	9,162,000	8,993,000	16,367,000	966,000
Missouri	5	7,900,000	7,710,000	13,801,000	921,000
New York	9	7,547,000	7,450,000	13,708,000	783,000
Ohio	7	4,599,000	4,298,000	7,865,000	657,000
Pennsylvania	22	40,468,000	39,847,000	69,993,000	2,705,000
Texas	5	4,566,000	4,488,000	8,482,000	356,000
Washington	4	1,845,000	1,793,000	4,339,000	290,000
Other States **a**	34	37,093,000	36,468,000	66,676,000	3,366,000
	132	148,859,000	145,747,000	267,319,000	13,913,000

a Including Colorado, Georgia, Indiana, Kentucky, Maryland, Minnesota, Montana, Nebraska, New Jersey, Oklahoma, Oregon, South Dakota, Tennessee, Utah, Virginia, West Virginia, and Wisconsin.

ESTIMATES OF PRODUCTION, SHIPMENTS, VALUE, AND STOCKS OF FINISHED PORTLAND CEMENT IN 1924, BY DISTRICTS

(Subject to revision)

Commercial district	Active plants	Production Barrels	Shipments Barrels	Shipments Value	Stocks Dec. 31, Barrels
Eastern Pennsylvania, New Jersey, and Maryland	22	38,281,000	37,630,000	$65,809,000	2,488,000
New York	9	7,547,000	7,450,000	13,708,000	783,000
Ohio, Western Pennsylvania, and West Virginia	12	14,322,000	14,030,000	25,535,000	1,370,000
Michigan	15	9,162,000	8,993,000	16,367,000	966,000
Wisconsin **b**, Illinois, Indiana, and Kentucky	11	21,856,000	21,355,000	38,012,000	2,040,000
Virginia, Tennessee, Alabama, and Georgia	12	11,347,000	11,375,000	19,224,000	469,000
Eastern Missouri, Iowa, Minnesota, and South Dakota **c**	11	14,851,000	13,982,000	25,307,000	2,737,000
Western Missouri, Nebraska, Kansas, and Oklahoma	11	9,912,000	9,595,000	16,887,000	1,482,000
Texas	5	4,566,000	4,488,000	8,482,000	356,000
Colorado and Utah	5	2,425,000	2,378,000	5,065,000	316,000
California	10	11,615,000	11,502,000	25,649,000	470,000
Oregon, Washington, and Montana	9	2,975,000	2,969,000	7,274,000	436,000
	132	148,859,000	145,747,000	267,319,000	13,913,000

b Began producing and shipping June, 1924. **c** Began producing December, 1924.

Imports and Exports of hydraulic cement, by months, in 1924 and 1925 in barrels. a

Months	Imports 1924	Imports 1925	Exports 1924	Exports 1925
January	153,839	229,838	88,586	71,596
February	162,930	119,077	62,606	56,249
March	160,517	(b)	91,224	(b)
April	148,137	.....	83,200	.....
May	161,304	.....	88,850	.....
June	196,655	.....	74,064	.....
July	108,944	.....	60,139	.....
August	192,634	.....	85,883	.....
September	138,369	.....	69,470	.....
October	214,987	.....	79,180	.....
November	198,806	.....	42,490	.....
December	173,814	.....	52,851	.....
	2,010,936	.....	878,543	.....

a Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision.
b Imports and exports in March, 1925, not available.

Total shipped from cement plants..... 5,162,000 5,210,000 5,933,000 8,995,000 12,771,000 14,551,000 15,036,000 83,251,000 145,747,000

Increased Demand for Sand, Gravel

More Road Work Proposed by State —Methods of Increasing Revenue Are Described. Low Bids; More Miles

By Our Indianapolis Correspondent

AN ANNUAL increase of $3,000,000 in the revenue of the state highway commission of Indiana for the next two years is requested in the budget report filed by the commission. The increased amount of road work proposed is of vital interest to road builders and cement and sand and gravel interests of the state. The commission's report does not suggest the method to be used by the Legislature in providing the additional revenue, but does set out the estimated receipts which will be received by the department during the next two years from gasoline tax, automobile license fees, inheritance tax and Federal aid.

The report estimates that growth of automobile traffic in the coming biennial period will increase the gasoline tax about $1,400,000 over the sum of the last two years. It is also estimated that the normal increase in license fees, at the present schedule will be about $1,500,000 during the two years. The report shows that if the program of the commission is to be carried out, $2,900,000 additional revenue must be provided by the Legislature for 1926 and $1,850,000 additional for 1927. It is shown that there now is, or will be within the next two years, $10,000,000 of Federal aid available for Indiana. The commission suggests new construction this year which will absorb $4,000,000 Federal revenue and for each of the next two years $3,000,000. Of the $3,000,000 increase in revenue asked, it is proposed to spend about $2,000,000 on new construction of roads and bridges. The remaining $1,000,000 will be spread over other items, including purchase of materials, maintenance and overhead.

Because bids that already have been received for carrying out the state highway commission's 1925 paving program have been materially lower than estimates, state highway officials are confident that it will be possible this year not only to carry out the definite program of paving, but also to carry out part of the commission's tentative program. From present indications, it is regarded as probable that the commission may be able to provide for the paving of forty miles of its seventy-mile tentative program.

Increased demands for the various grades of sand and gravel on short notice, attributed to the spring boom in building activities, have compelled sand and gravel contractors in some instances to adopt new methods. Lewis H. Colvin, sand and gravel contractor, Indianapolis, Indiana, is obtaining equipment by which he will be able to store various grades of sand and gravel in separate bins, keeping large bins filled with graded material so that he may supply the building contractor with the desired material on short notice. In order to keep pace with demands for sand and gravel, Mr. Colvin has bought a hoisting machine capable of removing and placing 700 yards of gravel a day.

The Neal Gravel Company is taking over the plants and gravel properties of the Carmichael Gravel Company, about a quarter of a million dollars being involved in the transaction. The gravel industry in that county is extensive and an important commercial asset. The Neal Gravel Company now owns extensive plants in Attica, Covington and Silverwood in Fountain County, and other plants in Warren, Vermillion, Parke and LaGrange counties in Indiana, and Crawford county, Illinois.

On April 9th, an election was held in Memphis, and a large bond issue for streets, sewers, schools, water works and park additions was voted, totaling $3,100,000 for the city and $2,050,000 for Shelby county. In the former for streets, bridges and sewers is an item of $900,000, for the Vance Woods purchase for park purposes $300,000, for the Harahan viaduct in which Memphis will aid in building on the Arkansas side $350,000. New approaches from the Tennessee side are also contemplated. The other items pertain to schools, hospitals, buildings, etc.

The Allen Gravel Co., Exchange Bldg., Memphis, reports good April trade in Tishomingo road gravel and their pits operating.

The Wolf River Sand and Gravel Co., producers of sand and gravel, are having good activity in Memphis building trade and surrounding sections.

Cement Business Looks Alive

Plants Getting Down to Regular Production Basis Again. Some Expansion Reported and New Plants Also

By Our Special Correspondent

THE SPRING SEASON shows active conditions among the cement mills in the Lehigh Valley section of Pennsylvania, and practically every mill is on the producing list. The lull in construction operations in different parts of the country has shown no effect, as yet, on the situation in this district, for road-building and other accounts are keeping orders at a good level, and heavy shipments are leaving the plants. Road construction will be a feature of sales in the weeks ahead. The Philadelphia territory is drawing quite heavily on the local mills, for there is a good volume of construction work going forward in that section.

Following the return of open weather during the latter part of March, there has been a noticeable increase in shipments from the mills, the last week of March recording an increase over a year ago. Distribution, however, has not reached that high point, and probably will not this year. Producers show no anxiety regarding the present trend; it is generally believed that the next eight months will show a record of heavy tonnages. The shipments by rail and motor trucks are on the increase with the advent of the spring season.

The resumption of operations at several of the important mills has called men back and increased employment during the past few weeks. Wage scales hold uniform and no change is expected in this direction. There has been heavy activity going forward at the limestone quarries and fair sized working forces are being engaged on this account.

The tendency for stocks to accumulate, as evidenced during some of the weeks past, is rapidly disappearing and current manufacture is on a basis only sufficient for the incoming spring business, although wherever possible material is going into reserve. Regarding the status of cement production in this as well as other parts of the country, B. L. Swett, sales manager of the Lehigh Portland Cement Co., set forth in a recent statement that the cement industry has had ample productive capacity to take care of all needs. From an output of 137,000,000 barrels in 1923, the 1924 total increased to almost 149,000,000 barrels; the industry has present capacity for still greater production. Mr. Swett expresses the opinion that highway construction will be of steadily growing importance, while the amount of farm work to be carried out in 1925, will also be very large.

An interesting deal which has just been consummated is that of the purchase of the plant of the Hudson Valley Cement Corporation at Alsen, N. Y., by the Lehigh Portland Cement Co., Allentown, Pa., one of the leading interests in the Lehigh Valley district. This acquisition will give the company a total of 19 mills, in different parts of the country, all of which are equipped for active production. The company is reported to have tentative plans for a modern plant in the Alsen section. Manufacture is being maintained on a good basis at the company's various mills.

The Nazareth Cement Co. is operating its mills at Nazareth, with a regular working force, and expects to maintain operations for an indefinite period. The company has also been active at its stone quarries in Lower Nazareth Township, where heavy tonnages of rock are available for the plant. The Phœnix Portland Cement Co. is another active interest in this same district.

According to a statement of Herbert E. Steiner, president of the Coplay Cement Mfg. Co., Coplay, at the annual meeting recently, the company is looking forward to a capacity year. A full time operating schedule is now in force and will be maintained indefinitely. Large shipments have been leaving the plant in recent weeks.

Maximum production is being developed at the works of the Atlas Portland Cement Co., Northampton, and there has been a noticeable increase in distribution of material during April; a regular working force is being employed. The Dexter Portland Cement Co. is busy at Nazareth, while the Giant Portland Cement Co. is running almost normally at its Egypt mill. The Whitehall Portland Cement Co., at Cementon, and the Hercules Cement Corporation at Hercules, are other active

producers at the present time. The Alpha Portland Cement Co. is operating at good capacity at its Martin's Creek mill, where production is now concentrated in this district.

The Cumberland Hydraulic Cement & Mfg. Co., Cumberland, Md., has disposed of its former mill and warehouses on Valley Street to the city, and the transfer of the property will be made immediately. The municipality purposes to make alterations in the structure and will use for city service.

The call for cement is advancing in the Chattanooga, Tenn., district and most of the mills are running under capacity schedule. Indications point to a continuance of brisk production for weeks ahead and plant expansions, now in progress, will likely soon be placed in service. The Dixie Portland Cement Co. is running on a heavy basis at its mill at Richard City, and has recently completed the establishment of a new raw grinding department, giving considerable greater efficiency in this department. The Signal Mountain Portland Cement Co. is also running full, with large shipments leaving the plant; the mill has a rated output of 3,000 barrels per day, to be increased to 4,500 barrels with the completion of a new unit in course of bulding. The plant has storage facilities for about 100,000 barrels of material.

A new cement mill is being projected in the vicinity of Dawson, Okla., by I. P. Crow, 320 Boulder Street, Tulsa, Okla., and associates. It is proposed to construct several units on a large tract of property, recently acquired. A company will be formed with capital close to $1,000,000 and equipment.

A merger of cement interests is said to be under way, headed by the Security Cement & Lime Co., Baltimore, Md., with mills at Security, Md., and Berkeley, W. Va.; it is proposed to consolidate at least four companies, under the name of a new organization to be known as the North American Cement Corporation. Details of the merger are now being determined.

Jno. A. Denie and Sons Co., Adams Ave., had a good exhibit of cement, lime, sand, gravel and other products handled by them at the recent exhibition of the Merchants and Manufacturers, in the Auditorium, Mem-

The New Telsmith Plant

On April 15th construction was started on the new factory of the Smith Engineering Works, Milwaukee, Wisconsin, manufacturers of Telsmith equipment for mines, quarries and gravel pits.

The new plant will be located at Lake and Holton Streets on the north edge of the city, partly within the city limits and partly in the township of Milwaukee. The factory will front on Lake Street, a new street 120 feet wide, serving as a main traffic artery between the northeast and northwest portions of the city. The plant will be provided with track connections both to the Chicago, Milwaukee and St. Paul and to the Chicago Northwestern Railways. At present three buildings are being constructed. The main building will be 175 feet by 246 feet, equipped with five electric cranes, having an aggregate lifting capacity in excess of 50 tons. Fireproof construction will be used throughout. The plant will be hot water heated with electrically driven pumps. Sanitary and power equipment will be of the most modern type. The management states that the new factory will double the company's output while provision is being made for further extensions in order to double the capacity again at a later date.

Poidimeters for Cement Plants

The Schaffer Poidometer Company of Pittsburgh, Pennsylvania, announce that they are engaged in building four Poidometers for the new plant of the Ohio Portland Cement, Inc., at Painesville, Ohio, to be used for weighing stone and clinker. They are also furnishing two machines for the new plant of the Brazilian Portland Cement Company at Sao Paulo, to be used for proportioning stone and shale, and equipped with trucks so that they can be moved from one storage bin to the other.

On April 24, at Nashville, the Tennessee Highway Department, J. G. Creveling, Jr., Commissioner, takes bids on ten projects of bituminous or cement concrete surfacing road work the total cost of which will be around $1,200,000. Tipton, Haywood, Crockett, Marion, Grundy, McMinn, Sumner, Cumberland, Hamblen and Anderson are the counties in which the mileage is located.

Return To Normal Conditions

Quarries, Pits and Materials Markets Active — Prices Maintain Their Levels. Building Falls Off.

By Our Eastern Correspondent

THE PENDULUM continues to swing a little backwards in the construction industry in the eastern districts and the sand, gravel and crushed stone markets are among those in the line of basic building commodities to feel the effect of the movement. The general prediction of an active spring season in this branch of operation has only been substantiated in part up to the present time, for speculative building of dwellings and apartments has fallen off materially because housing accommodations are now pretty well equal to the demand.

In this return to more normal conditions, of actual readjustment, there are decidedly bright spots. The industry as a whole is maintaining a good average of immediate work, and the character of construction is of the better class and better workmanship; first grade skilled mechanics and laborers are being kept busy, and there is no attempt on the part of employers to scale wages downward, despite the fact that this, eventually, must come. Again, the material markets, including cement, sand, gravel and crushed stone are exhibiting marked stability under a reduced call; there has been no indication of reducing present price levels and these schedules bid fair to hold throughout the spring season. Finally, over-production in certain lines is being righted and available stocks are being absorbed in a manner that gives encouragement to future outputs.

This matter of over-production is not so keenly evidenced in the sand, gravel and crushed stone fields, as these lines are not solely dependent upon building operations for distribution. Spring road-building programs of states, counties and cities are being developed for immediate consideration, and numerous bulk orders already have been placed for these materials. While some appropriations for such work are being curtailed to a certain extent, this is not generally true where streets and highways have been decided upon for improvement. These projects will go through as scheduled, and will bring a good call to the crushed stone and affiliated fields.

Stone quarries in the New York producing centers and Northern New Jersey are running under a fair rate of output; some such plants have booked orders that will absorb capacity for several months ahead, while others are turning reasonable bulk orders for current outputs. Sand and gravel pits, likewise, are developing spring production under a good average rate; working forces in several instances have not been brought up to a normal quota, but there is more keenness on the part of the employed men to really be on the job and to accomplish what might be called a full day's work. Additional machinery has been brought into service at several plants, not so much for increased production as for increased efficiency and also, incidentally, to be a little more free of the labor element and the difficulties that surround present day employment.

The material markets show no pronounced change under lessened sales and distribution. Prices of standard commodities, with the exception of brick, are being well maintained, and producers and dealers are showing marked aptitude in stabilizing the situation; there is no general tendency to cut figures below established levels, despite the keen attenion to securing orders and it is only in large bulk business that discounts are liberal. The present supply of stocks, including sand and gravel, is equal to the call, and dealers show no hesitancy in keeping up their yard supplies for a normal demand. Inquiries from contracting interests are growing more numerous and some of the larger companies in this line in New York have building contracts on hand that will carry through into the fall season.

For wholesale account, the best grade washed gravel continues at $1.75 a cubic yard in cargo shipments, 1½ and ¾ inch stocks. The call is fair, and pressure seems to be exerted for a downward trend; probably a month or two hence may bring a lower standard figure, but to so prophesy now is only guesswork. Building supply dealers are asking $3.00 a cubic yard for the material, both sizes, delivered on the job in Manhattan and Bronx Boroughs.

Local sand producers have suffered a little set-back with a market reduction of 25 cents a cubic yard for

first class washed material on a wholesale basis, making a price of $1.00 effective in this market; the level during this month of a year ago was $1.25. The call for stock for immediate service has diminished, principally for retail account, with dealers still asking $2.00 a cubic yard for deliveries in established zones.

Crushed stone is holding its own well and shows no change in the figure of $1.75 per cubic yard, 1½-in. stock, but a movement upwards to $1.85 in the case of ¾-in. material. Both of these levels are identical with those of a year ago at this same time. There is an improved call for the commodity, with road-building interests in prominence. Building supply yards are quoting both stocks at $3.00 a cubic yard, delivered on the job.

Portland cement continues as a feature of the New York market in regard to demand, and the lull in construction activities has not had much effect, as yet, on this material. It is doubtful if the decrease in residential operations will make any noticeable change in the cement market. Prices hold uniform to those prevailing for several months past. The price alongside dock to dealers and contractors is $2.15 a barrel in carload lots, without bags, subject to cash discount. Delivered to points of destination, the figure is around $2.50 in wholesale lots. Across the Hudson River, at Jersey City, dealers are paying $2.35 for the material, f. o. b., carload lots. New York supply dealers a good call for cement, at $3.00 per barrel, less 10 cents bag discount, delivered on the job. Brooklyn material yards are asking close to the same level. The past month shows no change in mill bases at the different important producing centers; Lehigh Valley plants are holding to $1.95, with the same figure prevailing at Universal, Pa., Buffingtown, Ind., Fordwick, Va., and in the Tennessee districts. The Hudson, N. Y., district asks $2.05 a barrel in carload lots, wholesale, which price is also quoted at Hannibal, Mo.

The New England districts are maintaining a good average of construction work, which, though still below the gross of a year ago, is keeping producers and dealers quite busy. The outlook is encouraging and a fair volume of new operations looms ahead. The prices of materials show no important change. Sand is being sold at $1.00 a ton in the wholesale market, best washed material. Good washed gravel is available on wholesale account at $1.50 a ton, both 1½ and ¾-in. stocks. In connection with crushed stone, an increasing call is being handled on a basis of $1.60 a ton, 1½ and ¾-in. material. The quarries in Connecticut and Massachusetts are resuming activities and present indications bid fair for a continuance for several months ahead. Portland cement is quoted at $2.55 a barrel, less bags, to local dealers and contractors. The supply yards are retailing the material at a figure of $3.40 a barrel, with 10-cent bag rebate.

The former Keystone slate quarry near the Lehigh Gap Road, Slatington, Pa., has been leased by Oscar Thomas and Norwood Hankee, who propose to organize a company to operate the property. Improvements will be made and additional machinery installed for early production.

Highway Research Board Adds Contact Men

Mr. Chas. M. Upham, Director of the Highway Research Board, announces the extension of the Board by the appointment of contact men from the various engineering colleges of the country. At the present time 80 colleges have responded to the call and have signified their willingness and desire to co-operate by the appointment of a member of their faculty to act with the Board. The contact man in every case has been one who has done considerable work along the line of highway research.

Many important research problems are now being studied by the colleges, and it is felt that the activities of these institutions should be correlated with those of other research agencies. The university contact men, working in conjunction with the contact men appointed by the state highway departments some time ago, fill a want that has been apparent.

The research agencies of the state highway departments and the engineering colleges are constantly at work not only to improve the construction of highways, but also to consider the economic factors that enter into the problem. The highway Research Board is confident that the linking of these agencies to the Board will result in great benefits to the country.

New Incorporations

The Central Cement Company has opened a cement block factory at 1040 Montcalm street, Indianapolis.

Kline Brothers Concrete Products Company, Highland, has been incorporated with a capital stock of $20,000 for manufacture and sale of concrete products. The directors are: Clarence Kline, Walter Kline, Roy Kline, Henry Van Til, Samuel Van Til.

Independent Concrete Pipe Company, Indianapolis, Indiana, increased capital stock from $100,000 to $156,000, said increase being preferred stock.

Freeland Stone Company, Sellersburg, changed name to Davis-Freeland Stone Company.

U. S. Concrete Products corporation, Gary, Indiana, has a capital stock of $25,000 to deal in concrete products. The directors are: Otto McMurray, Ethel McMurray and A. P. Draper.

The Worth-Haslip-Graham Gravel Company, Inc., Ft. Wayne, has been incorporated with a capital stock of $15,000 to deal in gravel blocks, dredge ditches and excavate. The directors are: Lloyd W. Worth, Charles H. Haslip, Oliver G. Graham, Asa W. Dirck, Lester Blaine Harper.

The Universal Concrete Products and Gravel Company has been incorporated at South Bend, Ind., with a capital stock of $75,000. The incorporators are Harry Polis, Anna Polis, Alex Belkin and Norma Belkin.

The Central Oolitic Stone Company, Bloomington, Ind., increased preferred stock from $175,000 to $250,000.

The Alpha Concrete Products Company has established a concrete block plant at 3835 Orchard avenue, Indianapolis.

The Shawnee Stone Corporation has qualified to do business in Indiana. It is a Delaware corporation. John L. Torphy of Bloomington, Ind., is state agent.

Midcontinent Portland Cement Wilmington, Delaware; capital $11,000,000; to deal in all kinds of cement.

Cambridge Cement Stone Company, Boston, Massachusetts; capital $200,000 and 2000 shares no par value stock. Incorporators: Paul A. Mazzuchelli, Newton Center; Virgini E. Mazzuchelli, Dorchester, and Arthur M. Tracy, Brighton.

Better Block Company, Milwaukee, Wisconsin; capital $10,000; to manufacture and deal in concrete products. Incorporators: Alfred Hollmann, Paul Hollmann, Otto Schwinn.

The Gravel and Sand Corporation, St. Louis, Missouri, capital $50,000; to deal in sand, gravel and the products and by-products of sand and gravel. Incorporators: John K. Goin, 5115 Washington Boulevard, Russell G. Goin, A. S. Roberts, W. M. Aubuchon and Evan T. Aubuchon.

Crushed Stone and Products Company, Troy, New York, capital $5,000. Incorporators: E. Ott, I. C. Norton, H. D. Bernard.

Snagg Sand and Gravel Company, Incorporated, Waterbury, Connecticut; capital $50,000—to begin with $6,500. Incorporators: A. R. Snagg, J. E. Pilkington and William Burns, of Waterbury.

The Tumblebug Scraper Company, Rapid City, South Dakota, capital $200,000; to manufacture and deal in road scrapers and highway machinery. A. C. Hunt, former secretary of the State Cement Commission is one of the incorporators.

Union Concrete Pipe Company, Huntington, West Virginia; capital $200,000; to manufacture pipe; a subsidiary of the Union Sand and Gravel Company, whose officers will control the new concern; E. P. May, president; H. A. Scholze, vice-president; J. L. Richmond, treasurer; and G. W. Sullivan, secretary.

Gypsum Corporation of America, Wilmington; capital $5,000,000; to mine gypsum and other minerals.

W. H. Houghton and associates from the Boulder Lime and Cement Company of Las Vegas, Nevada, recently purchased 1280 acres of clay, lime and gypsum near Glendale, California, and proposes to erect a huge cement plant at an approximate cost of $2,000,000.

A new cement plant at Dawson, Oklahoma, is planned by I. F. Crow and associates. Articles of Association have been filed. The plant is to cost $1,500,000, with daily capacity of 2500 barrels of cement. Incorporators: A. L. Farmer, Cyrus H. Sweet, C. H. Terwilleger, Arthur H. Craver, T. J. Hartman, A. E. Bradshaw, H. L. Standeven, O. K. Eysenbach, R. Otis McClintock, I. F. Crow and C. A. Mayo.

F. S. Baker of Los Angeles is organizing a company with capital of $250,000 to operate the marble de-

posit contained in 30 acres of land recently purchased near Columbia, California.

The Yosemite Portland Cement Corporation, Merced, California, was recently incorporated to operate about 1,000 acres of limestone and 1500 acres of clay deposits; offering $1,500,000 Class "A" 8 per cent cumulative participating common stock at $10 per share. A. Emory Wishon, president; W. A. Sutherland, vice-president; Murray Bourne, secretary-treasurer.

The Signal Mountain Cement Company, Chattanooga, Tennessee, is pushing work on its new $250,000 unit which will add 1500 barrels per day, making Signal's total 4500 a day.

The Hudson Valley Cement Corporation's mill at Alsen, New York, has been purchased by the Lehigh Portland Cement Company of Allentown, Pennsylvania.

Ross and Whelan, Incorporated, Trenton, New Jersey, contractors, have purchased the land, plant, machinery, buildings and general equipment of the Morrisville Concrete Products Company, near Penn Valley below Morrisville. The figure named was $25,000, including about 20 acres of land.

The Union Portland Cement Company of Boise, Idaho, recently decreased its capital stock from $2,500,000 to $1,000,000.

New Link-Belt Book

An interesting book describing Link-Belt Rivetless Chain replete with illustrations, has just been published by the Link-Belt Company.

The book portrays in a pleasing manner the assembly and dissembly of this simple chain, which has only three parts. The text matter is supported by tables of weights and strengths, and describes many of the uses to which this chain can be put.

This chain may be used to advantage on all types of conveyors and elevators; its light weight and great ultimate strength make it ideal for extremely long conveyors, where the load is heavy and the weight of the chain an important consideration. The Anthracite Coal Industry has used this chain for many years, and its success in this industry has served to bring the attention of other industries to these salient features.

Fuller's Earth in 1924

The largest output of fuller's earth on record is that for 1924, as reported by the Department of the Interior through the Federal Geological Survey working in co-operation with the State Geological Surveys in Alabama, Florida, Georgia and Illinois. Thirteen operators in six States reported that 177,994 short tons of fuller's earth were sold in 1924, valued at $2,632,342, or $14.79 a ton. This output is 19 per cent greater than that of 1923, but it is more than four times that of 1914. The value of the output for 1924 was also the largest ever recorded. It was 17 per cent greater than that of 1923 and 5 per cent greater than that of 1920, the previous year having the record of greatest value. It was more than six times as large as that of 1914. Since 1920 there has been a steady decline in the average price per ton, the price in 1924 being nearly $5 lower than that in 1920, the year of highest average.

The South continues to produce the larger part of the output. Georgia was the leading State in output and value, displacing Florida, which has occupied that position since the beginning of the industry. Florida was second and Texas was third in output and value. These three States reported 93 per cent of the output and value in 1924. The producing states, named in the order of their output, were Georgia, Florida, Texas, Illinois, Massachusetts and Alabama.

Hewitt Rubber Company Changes

Control of the Hewitt Rubber Company of Buffalo, New York, manufacturers of belting, tires and other rubber products, has been acquired by J. H. Kelly and F. V. Springer from the estate of the late H. H. Hewitt. Mr. Hewitt founded the company in 1908.

At a meeting of the board of directors on April 17, Mr. Kelly was elected president and general manager and Mr. Springer first vice-president and director of sales. The new officers immediately announced that an expansion program would be put in force which would result in a wider distribution of Hewitt products, and the development of a more aggressive sales and advertising policy which was impossible under the control of the estate.

Business Good, Considering Season

Turnover of Stocks Quite Satisfactory; Steel Barge Construction Is Active; Market Conditions Are Firm

By Our Pittsburgh Correspondent

SAND AND GRAVEL producers in the Pittsburgh, Pa., district have advanced operations considerably since April 1st, and a large tonnage of material is reaching the local port. River fleets which have been idle or in course of repair in recent weeks are being placed in service and crews are being added to help the activity now going forward. The spring season bids fair to be a good one in this section, and the leading companies in the sand and gravel trade are showing no hesitancy in developing close to capacity production.

The turnover of stocks has been quite satisfactory up to the present time. Inquiries are growing more numerous and actual business placed is on the upward trend. This is not only true at Pittsburgh but in the neighboring districts given over to steel and other basic industries which draw heavily on the output. There is a noticeable increase in new river craft on the Allegheny and Monongahela; barges and steamers which have been in course of construction during the winter are being put to good service in try-out periods.

The local shipyards are maintaining a good rate of activity, particularly in the line of steel barge construction, and a heavy volume of orders has been taken since the first of the year not only from Pittsburgh interests but from sand and gravel producers in adjacent points of the south, including Tennessee, Ohio and Kentucky. In the line of equipment installations there has been parallel trade, and the Marine Mfg. & Supply Co., one of the leading companies in this line, has been kept busy during the past few months.

A number of sizeable contracts have been recorded for material since the turn of April. The McClain Sand Co., Point Marion, Pa., is the low bidder for sand and gravel for the construction of lock and dam No. 7, Monongahela River, to be carried out by the local Federal Engineers. The company bid $68,000 for 20,000 tons of sand and 40,000 tons of gravel, and is expected to receive the award. It is said that the company will secure the material from an untouched district on the Cheat River. The Ridgers Sand Co., Pittsburgh, has tendered a low bid to the county for river sand for asphalt plants, totaling 34,000 tons at a figure of $1.20 a ton; there has been rather keen competition in connection with bids asked by the county for a total of about 10,000 tons of crushed stone, delivered to 152 different points in the district, all nine bidders proving low on parts to various destinations at a figure of about $2.65 a ton.

Market conditions hold stable and uniform. Prices maintain firmly at present levels and there is a firmness in general tone that is decidedly encouraging. In the wholesale market, best river sand holds to a quotation of $1.20 and $1.25 a ton at yard hoists, and loaded stocks at around $1.60 and $1.70. Good river gravel is priced at $1.15 and $1.20 a ton at the yards, 1½ and ¾-in. stocks, wholesale. In the line of crushed stone, the present established figure is $2.85 a cubic yard, both 1½ and ¾-in. selections, cargo shipments. Portland cement shows no change from a quotation of $2.19 a barrel to dealers and contractors, without bags, subject to cash discount. There is a fair call for cement at this writing, with inquiries giving promise of an increasing business in the near future.

The Keystone Sand & Supply Co., Pittsburgh, is developing a fine rate of production on the river, and has its digger in active service. Good distribution of material is being carried out at the local port. The company has just received a new sand and gravel digger from the Dravo Contracting Co., built at the Neville Island yards, and proposes to place the unit in service at an early date. The hull is all-steel, 155 ft. long, 44 ft. wide and 8 ft. deep; it is divided into 16 water-tight compartments. The dredge has a rated capacity of 5,000 tons of material in a 10-hour period, and is provided with a digging ladder 90 ft. long, suitable for dredging to a depth of 50 ft. The digger is equipped both with electric and steam power apparatus, and will be used on all of the three local rivers, as the occasion warrants.

U. S. Gypsum Enters Stucco Field

THE United States Gypsum Company has added to its list of products oriental stucco, a combination of Portland cement stucco-base and a stucco-finish prepared in nine colors and white. Both are factory-mixed and require the addition of water only before their application. The base is a compound of Portland cement with other ingredients to make it water-resistive and plastic. It contains the proper amount of uniformly graded sand, which eliminates the possibilities of joinings showing through the finished surface, the trouble of adding other materials at the job and the danger of oversanding.

The finish is a hydraulic lime base compounded with materials which make it waterproof and non-staining. Mineral colors are ground into it. Its ingredients are automatically weighed and mixed, insuring correct proportions and uniform color. Its formula is one that has been used successfully in this country for about fifteen years. Its setting time is regulated so that ample time is allowed for its manipulation by the mechanic.

This material may be used over any construction on which any Portland cement stucco is applicable; but the company is recommending Gyp-Lap, a new half-inch gypsum board, a fireproof substitute for wood sheathing, as the ideal base for stucco. It recommends standard specifications, a half-inch scratch-coat and a brown coat three-eighths inch thick, reinforced with a 2 inch x 2 inch electrically welded steel mesh and covered with one-eighth to one-quarter inch of the stucco-finish.

This material is being presented to the building industry in conjunction with Textone, the plastic paint for interiors which the company put on the market last summer. From the point of view of the company's policies these materials are important for three reasons. They improve the mixed-car service to dealers. They mark the entrance of the company into the field of decorative architecture, relieving the previous situation in which the decoration of all the company's materials was left to the commodities of other manufacturers. And they make possible a complete wall-construction of United States Gypsum materials, starting on the outside of the wood studding, Gyp-Lap sheathing covered with oriental stucco; on the inside Sheetrock wallboard decorated with Textone, or if plaster is desired, Gyplath, the fireproof substitute for wood lath, covered with gypsum plaster which is decorated with Textone.

This paint and the stucco are being presented to the building industry by means of two books, one on each product, which comprise a history of the use of rough-textured walls in the historical periods of architecture and interior decoration. Each book contains colored and textured plates which show the combinations of texture and tone available for the various period styles. These textured plates are guides to contractors, mechanics and others for the reproduction of period-motifs in wall-treatment A modification of this nomenclature has been adopted by the Portland Cement Association for its current campaign on Portland cement stuccos.

Oriental stucco is being manufactured at present in the plant of the United States Gypsum Company at New Brighton, N. Y. It is stocked at all the company's mills, and preparations are being made for additional production units.

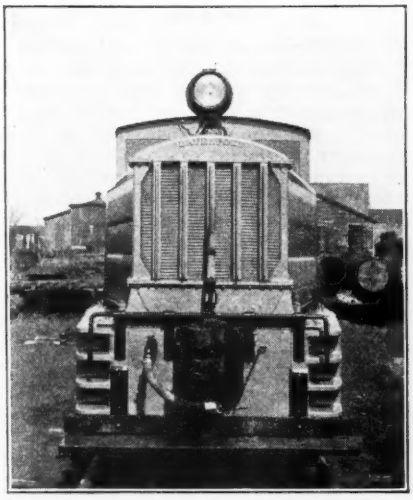
Harnischfeger—Forty Years

The Harnischfeger Corporation, formerly the Pawling and Harnischfeger Company of Milwaukee, have recently issued a 64-page book entitled "Forty Years of Progress." In this book is a history of the growth and development of this organization since its founding forty years ago, along with photographs and descriptions of the entire plant and personnel as it is today. Pictures and short descriptions of each of the various products in the electric crane, hoist, machine tool and gasoline excavator lines are also given. In all, this book gives a complete but concise description of the large P & H organization. Copies of the book will be sent on request.

The Harnischfeger Corporation announce the removal of their Pittsburgh sales office from 57 Fidelity Building to 621 Farmers Bank Building, Fifth Avenue and Wood Street. A. J. Dreyer is district manager and M. B. Bradley is sales engineer at this office. The change of address takes place on May 1, 1925.

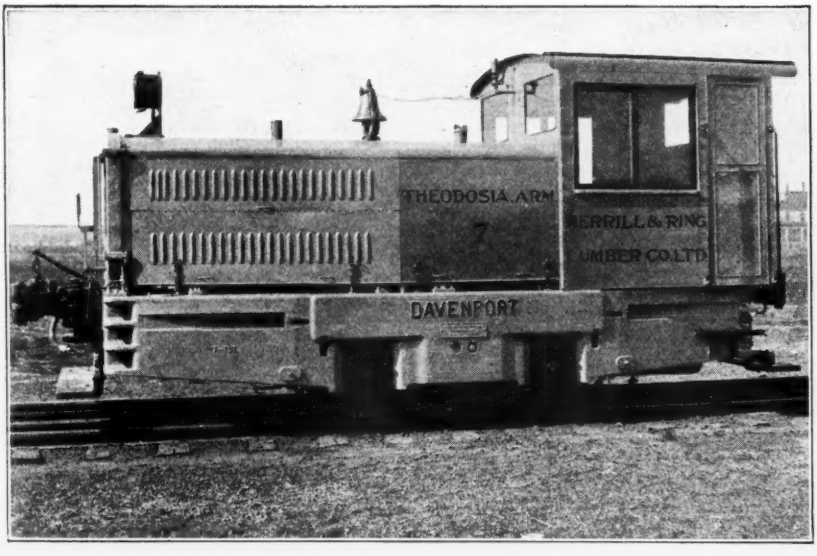
New Model Davenport Locomotive

A DECIDED tendency toward more attractive lines in gasoline locomotive construction is seen in the new 20-ton model designed by the Davenport Locomotive Works, Davenport, Iowa. With the long, slightly tapering hood and all-steel cab resting on a rugged, well designed under-frame, an appearance of balance and power is achieved that is in keeping with the service a machine of this type renders. There are no "hang overs" from steam locomotive design—all the parts and units in this new design being placed with efficiency and accessibility as the most important consideration. All working parts are enclosed and protected from dirt and the weather, but arrangement is such that inspection or adjustments can be made quickly and easily.



Roller chain transmission has been adopted since it reduces friction and wear to a minimum, gives higher mechanical efficiency, and furnishes a semi-elastic driving medium that protects the entire mechanism from shock. The four driving wheels have steel tires and are individually driven on four short axles of larger diameter riding in Timken roller bearings which take both the side thrust and weight of the locomotive. This individual wheel drive gives remarkable tracking qualities, each wheel acting independently to hold the rail under all conditions.

This new model is equipped with self starter, Westinghouse air brakes and electric lighting for the headlight and cab. A powerful six-cylinder Climax engine is used, and the design makes all parts instantly accessible.



Two Views of The New 20-Ton Davenport

The Page "Kleen Out" Bucket

THE efficiency of the well known Page scraper bucket is greatly increased by a new type of hoist bail spreader and dump block combined. The usual spreader is replaced by a special one consisting of two channels riveted together by means of two angle irons and placed at the right distance apart to accommodate the plate dump block. The new spreader is placed higher in the hoist bail than the old one and the hoist cable is attached directly above the block. A bridle chain arrangement prevents the spreader from twisting or tilting.

The "Kleen Out" bucket is in no way different from the standard Page scraper bucket except that it has the top partially or entirely covered and digging remains the same. When the operator starts to hoist the "Kleen Out" bucket, the tension maintained on the drag cable combined with the lift on the hoist cable draws the point of attachment of the dump cable directly under the dump block in the spreader. This, of course, means that the bucket is tilted back until the opening in the front of the bucket is almost straight up. It can be seen very easily that such a bucket would bail water if desired.

The new spreader and block can be put on any Page scraper bucket. It requires no alteration for its operation except an apron or cover on the back. The length of the dump line determines the angle at which the bucket is tilted back when hoisting and carrying. The longer the line, the less the degree of tilt.

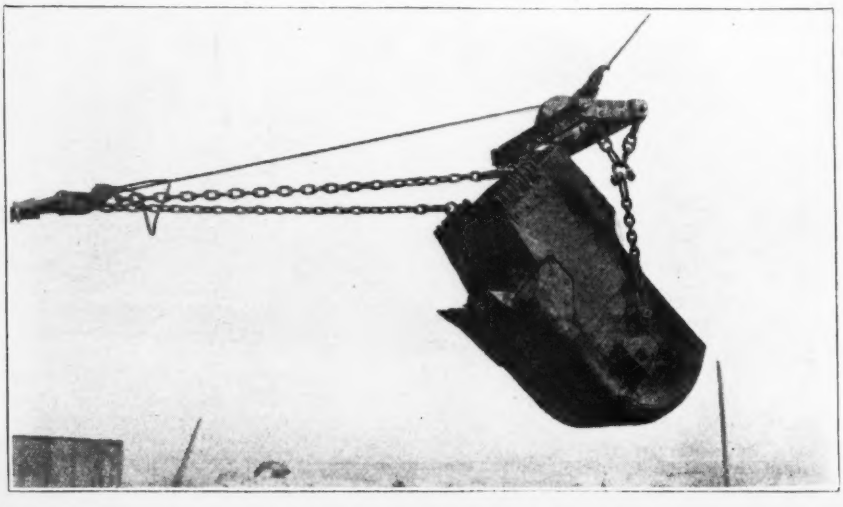
The nature of the material to be handled will determine the length of the dump line. For soft or sloppy materials a short line would be used, thus giving a high tilt. For other materials the bucket would be operated the same as a standard Page bucket.

Pennsylvania Pump Notes

Announcement is made by the Pennsylvania Pump and Compressor Company of Easton, Pennsylvania, that H. P. Rogers, 508 Leader-News Building, Cleveland, Ohio, has been appointed District Representative for the Cleveland territory.

Similar announcement is made of the appointment of T. J. Barry, Park Building, Pittsburgh, Pennsylvania, as District Representative for Pittsburgh territory.

The products offered by both these representatives are the well known Pennsylvania Air Compressors, both in single and double stage types, including direct connected gasoline driven portable compressors; and centrifugal pumps of the double suction single stage and multi-stage types, including a small pump for brine and water circulation, and a portable unit known as the Penny Pumper; also Air Lift Pumps.



The Page "Kleen Out."

A New Quarry and Mining Shovel

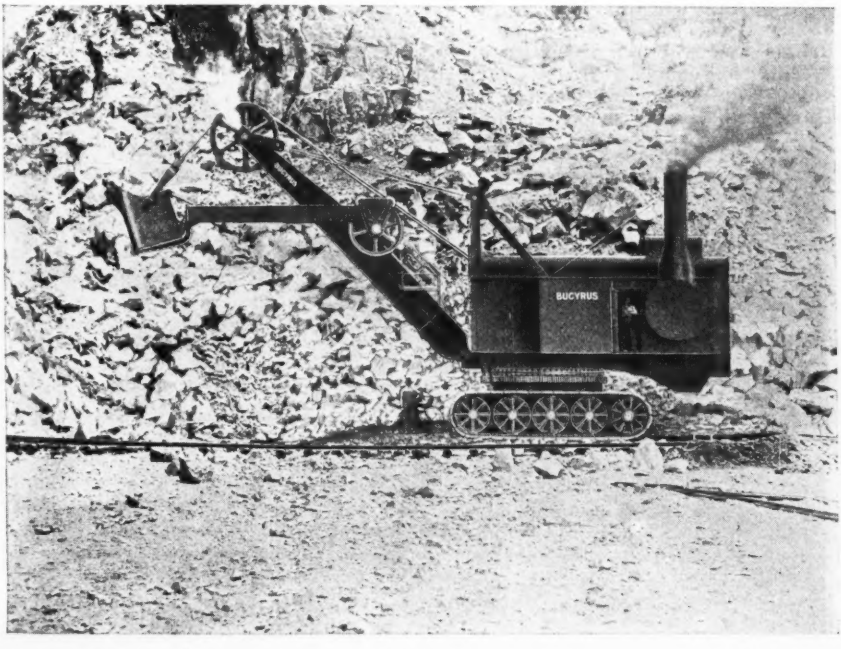
THE Bucyrus Company has just announced a new shovel that is fundamentally different from anything yet placed on the market. Realizing the fact that a low maintenance cost is of first importance in operating a shovel, especially for severe service such as in quarries, mines and for other work where extremely hard digging conditions are encountered, Bucyrus engineers have developed a 4-yard, full-revolving shovel which combines the rugged strength, power and speed of a railroad-type shovel, with the greater mobility and the full-circle swing of a revolving shovel.

This machine is known as the 120-B It is caterpillar mounted and may be operated by steam or by electricity. It is built with a close-coupled strength, sturdiness and digging power, heretofore found only in the railroad type shovel. For example, the boom is about the same length as that on a 115 ton railroad type shovel, and at the same time, its shafts are designed with from 30 to 50 per cent greater strength than heretofore has been used.

The base and the revolving frame are of solid casting construction without structural work, rivets or belts. These units incorporate even greater solidity of design than the heavy front end construction of a railroad type shovel.

It contains refinement of design such as superheater equipment, fire brick arch in boiler, and brass shell bearings, Never before offered as standard with any shovel. The grate area of the boiler is 10 per cent more and the heating surface 15 per cent greater than the most powerful railroad type shovel. With superheater equipment the boiler efficiency is further increased by the reduction of water and coal consumption by from 20 to 30 per cent.

This shovel is the largest that has yet been mounted on caterpillars. It has been brought out by the Bucyrus Company in order to meet the growing demand for a quick acting full revolving shovel of large dipper capacity, with greater strength, greater



The New Bucyrus Shovel.

power and greater mobility than has heretofore been produced, and at the same time with clearances which will enable it to operate in confined spaces and narrow cuts. It is not intended for work where very wide digging and dumping reaches are required. This company offers a complete line of stripping shovels for this purpose. A full description of this machine may be obtained from the new bulletin just issued by the Bucyrus Company.

The New Speeder Shovel

The Speeder Machinery Corporation, Fairfield, Iowa, have developed a half yard shovel to go with their light Speeder Crane. This shovel is of one half yard capacity and has been built to meet the popular demand for a light inexpensive shovel for excavation and other small jobs.

The shovel is so constructed that it is not necessary to make any changes in the machine other than simply to remove the crane boom and bolt the shovel boom on. A reversible cable crowd is used.

The drums on the "Speeder Crane" are so constructed that it is not necessary to change them in changing from the crane to shovel equipment. This machine may be used also as a drag-line without any additional changes as there are three main drums and a boom hoist drum.

This shovel has a capacity of from 400 to 500 cubic yards per ten hours. During this same period it consumes from 15 to 20 gallons of gasoline. The turntable diameter is 6 feet and the wheel base is 8x8 feet. The shipping weight is 16,000 pounds complete.

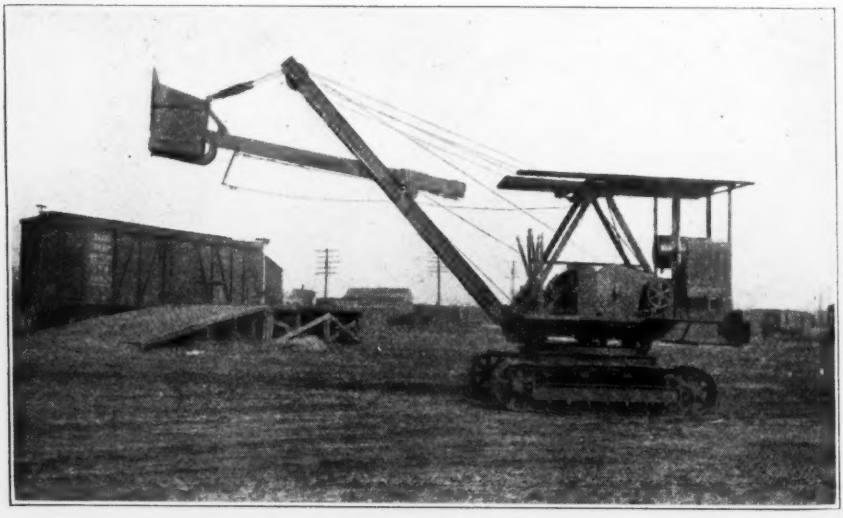
Black Granite Quarries

Several black granite quarries of excellent quality have been reported in the press recently, one located in South Dakota and one in California. The Keystone Arsenic Company at Keystone, South Dakota, is stripping the top soil off the ground where the deposit lies. Tests of the rock made last summer showed a granite of unusually high quality.

A fine quality of black granite is being produced from the quarry of Dr. J. T. Ireys nort of Lakeside, California. It is almost black and the face when polished has a mirror-like gloss and lustre.

Potash in 1924

The Department of the Interior announces that returns received by the Geological Survey from the producers of potash in the United States indicate that the output in 1924 amounted to 43,719 short tons of crude potash salts containing 22,896 short tons of potash (K_2O). The sales amounted to 37,492 short tons of crude potash containing 21,880 short tons of K_2O, valued at $842,618. Over 30,000 short tons of crude potash were held by the producers December 31, 1924.



The Speeder Shovel Crane.

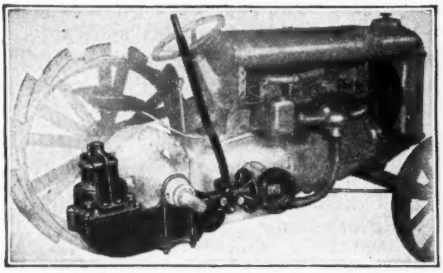
Miami Announces New Improved Power Scraper

JUST at the start of the dirt moving season, the Miami Trailer-Scraper Company of Troy, Ohio, is announcing a new and improved power scraper.

For the past three years these machines have been giving excellent service to contractors and brick manufacturers; also for cemetery and real estate development work. The term "contractors" of course, covers many subdivisions, such as grading roads and streets, excavating, stripping stone quarries, gravel pits and coal mines, building parks and playgrounds, dams or levees.

Because of the large demand for the Miami Fordson One-Man Power Scraper, production has been increased 300 per cent over last year. In the past six months some big improvements have been made in the design, but due to the increased volume production, the price remains the same, at least for the present.

The Power Winch is attached to the housing and rear axle of the Fordson Tractor. The main drive shaft is now equipped with three heavy duty Timken Taper roller bearings. The two rear bearings are constantly lubricated by oil in the gear case. The front bearing is lubricated by hard grease by means of the large grease cup. The bronze gear in the winch has been increased

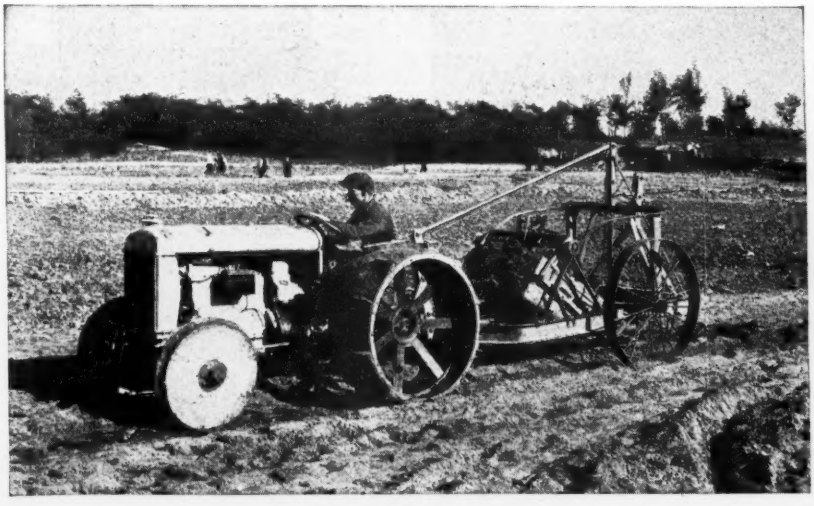


Detail of Power Unit

to 1⅞ inches in diameter, which insures one hundred per cent overload. The steel worm which drives the gear is hardened and ground. Both the worm and gear are enclosed in a dust-proof case and operate constantly in a bath of oil.

The frame was increased from 5 to 6 inches channel steel, which makes a most rigid unit that cannot be bent or broken.

One of the most important improvements is the cast steel automatic hitch. The ordinary plow hitch is entirely removed from the tractor and the heavy hook is bolted on in its place. There are no holes to drill or changes to make, for the same stud bolts are used. The scraper can be entirely disconnected from the Fordson in thirty seconds, leaving the tractor available for plowing or pulling trailers. The



The New Improved Miami Power Scraper

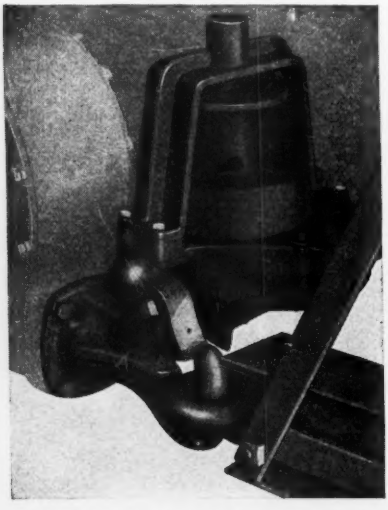
winch does not interfere in any way with other work, for it operates only when used in connection with the scraper. The cast steel hitch is also sold separately, for many contractors find it most valuable for various other classes of work.

The scraper pan is made of high carbon steel 3-16 of an inch thick. Each is punched so that a special cutting edge can be attached if ever desired. This cutting edge can also be attached at the factory at a small additional cost.

One man operates both tractor and scraper. The dirt is loaded, transported, and dumped without stopping or without the operator leaving the driver's seat. It is a continuous one-man proposition, one unit replacing from three to five teams depending upon the length of the haul and the class of material to be handled.

The Miami power scraper can be economically used for moving dirt up to fifteen hundred feet. The large pan is filled to capacity each trip. Due to the unusual construction, dirt does not spill off while being transported. The tractor can be operated at a high rate of speed, thereby saving an enormous amount of time and money.

The Miami Trailer Scraper Company has compiled some interesting dirt moving costs, which are mailed free to anyone upon request. These costs are taken from actual operations and are, therefore, very accurate.

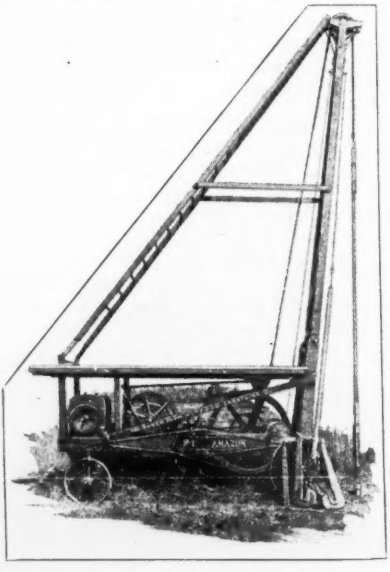


Detial Views Showing Automatic Hitch

The Amazon Drilling Machine

The Burch Plow Works of Crestline, Ohio, announces their new Amazon drilling machine. This machine is of improved construction built for durability and simplicity. A patent friction permits a change from spudding to pulling tools without stopping the engine or making any other changes. In spudding there is an extra friction brake for holding tools in position or feeding out rope. All levers on the machine are within easy reach of the operator.

The sill is 2¾x10 inches by 14 feet. It is mounted on 4-inch tire wheels. The main pulley has a 60-inch diameter and a 9-inch face. The most is 30 feet high in ladder form with a 16-inch crown pulley. The machine is equipped with a 10 H. P. two cylinder gasoline motor.



The Amazon Drilling Machine

Hendricks New Register

The thirty-third editions of Hendricks Commercial Register is announced as off the press and ready for distribution. It is a huge volume described as marking an epoch in business reference media in that it is the result of a third of a century of painstaking endeavor, which has resulted in a modernization calculated to greatly aid industrials who wish to purchase efficiently and economically.

New Industrial Crawling Tractor Crane

A LOCOMOTIVE crane is not a tool adapted for use in a few industries. It is a labor-saving device which is far more versatile and which has a much greater field of usefulness than any other machine whose function is handling material. It is not only useful but it has become practically a necessity on railroads, in shipping plants, in the iron and steel industries, in lumbering operations, in coal yards, on contracting work, in sugar manufacturing, in foundries, on docks and in practically all manufacturing plants.

Crawling tractor cranes have been developed to extend the usefulness of the locomotive crane beyond the limitation of rails and now several manufacturers of material-handling equipment have already entered this field, among them the Industrial Works, Bay City, Mich., who for the past 52 years have been building locomotive cranes and crane equipment.

They have just recently announced a new and greatly improved 10-ton crawling tractor crane. This crawler crane, known as their type DC, is very similar in outward appearance to the former types of tractor cranes built by that company, but its design embodies a host of new engineering features such as split gears for propelling, increased speeds, double clutch mechanism, unusually long tractor belts, independent functions, etc., which, it is claimed, make that machine the fastest, simplest, sturdiest and most rugged type yet produced, and the most economical to operate.

The most important of all the new features is the system of split gears by which each tractor belt is separately controlled. Two concentric vertical propelling shafts at the axis of revolution lead two independent but concentric trains of spur and bevel gears, each operating one tractor belt. Each belt is directly controlled by two powerful friction clutches and brakes in the revolving upperworks, which gives absolutely independent, definite and easy control over each belt while propelling. This is an all gear drive from engine to sprockets with no chains in the mechanism at all. The INDUSTRIAL type DC is said to be the only crawler crane which steers and propels by friction clutch. It is also said to be the only crane which has a friction clutch and band brake for each tractor belt. These features make maneuvering in close quarters comparatively simple.

All speeds of the motor operated crane have been increased 25 per cent which provides ample speed for

The New Industrial Crawler Tractor Crane.

the fastest possible handling of all materials. This new feature should make for great savings in time and corresponding savings in money.

The double clutch mechanism by which the two slowing band clutches are operated by one lever makes for very simple slewing. The direction of slewing is changed at will by the movement of the slewing double clutch lever. No reversal of the engine is necessary.

The crawling tractor belts are of ample length to give plenty of stability when lifting over either end, on any kind of ground.

The center distance between the two end sprockets on the "DC" is 10 feet, one of the longest on the market today, giving ample stability and support for a large range of operation.

All functions of this crane are absolutely independent of each other, which means greater certainty of operation. Separate levers actuating each function are conveniently placed on the operator's platform in the revolving upperworks. Different combinations of these independent functions may be utilized at one time to great advantage.

This crane can be equipped to operate with a steam engine, electric motor, gasoline motor or fuel oil engine of the Diesel type to suit any operating conditions known today. It is extremely versatile, operating with clamshell or dragline bucket, electromagnet, hook and block or grapple. It is readily convertible into a shovel or a pile driver. Any equipment that operates on a boom can be applied.

The utmost care has been used to combine the necessary strength with the light weight essential to a tractor crane, and convenience in operation and maintenance have been provided to the highest possible degree. The makers are confident that this new improved crane will continue to supply a demand for a general utility crane of small capacity sturdily built. It has already found a ready market in practically all fields of industry.

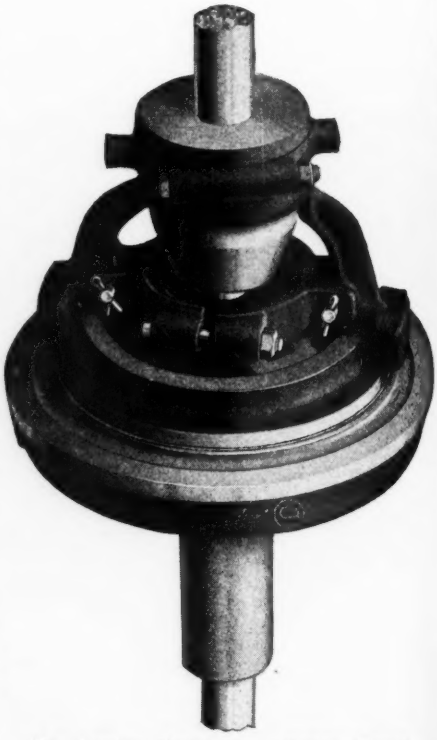
The Lemley Model "F" Friction Clutch

The Lemley Model "F" has been developed to meet the demand for a medium and light duty clutch which can be conveniently applied to practically any machine or countershaft which requires a friction clutch.

It has few parts, all of which are in plain view and readily accessible. No special tools are required to adjust or dis-assemble completely. The principle of operation is simple and is clearly evident after only a few minutes inspection.

Uniform pressure on the friction surfaces is assured at all times. The two toggles are adjusted at the same time by means of one split ring nut.

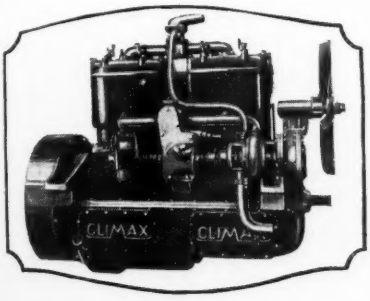
Free floating friction rings of fibre or asbestos brake-lining material is used. Model "F" is furnished as sleeve clutches, cut-off couplings, or bolted to the arms of pulleys, sprockets, gears, sheaves, etc. Descriptive bulletin gladly sent to interested parties.



The Lemley Model "F" Friction Clutch

Other types of "Lemley" clutches are built for various classes of work and for heavy or light duty. W. A. Jones Foundry & Machine Company, main office and works, 4401 West Roosevelt Road, Chicago, Illinois, are the exclusive manufacturers and distributors.

Rarin' to GO!



Climax "Trustworthy" Engines are used by most leading manufacturers of industrial machinery.

THERE'S a lot of the Spirit of the West in every Climax Engine. They are always "rarin' to go." No job ever seems tough enough to stop them. No conditions of temperature or fuel seem to phase them. They abound with built-in pep and power that in men we call vitality; in horses, stamina; in engines it's Trustworthiness.

That's why Climax Engines are first on the job in the morning, and the last to quit at night.

Most manufacturers of industrial machinery now equip with Climax—The "Trustworthy" Engine.

CLIMAX ENGINEERING CO.,

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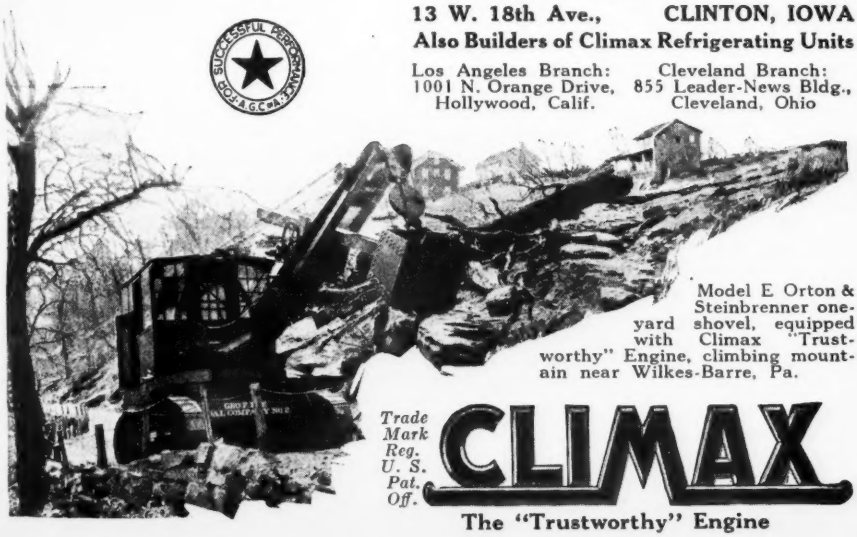


Model E Orton & Steinbrenner one-yard shovel, equipped with Climax "Trustworthy" Engine, climbing mountain near Wilkes-Barre, Pa.

Trade Mark Reg. U. S. Pat. Off.

CLIMAX

The "Trustworthy" Engine

Car Shortage Danger

ACCORDING to reliable authorities a car shortage this fall will be averted only by skillful handling of the situation by the railroads. It is true that they have added to their equipment in recent years, but 1925 will tax their facilities to the utmost. There is especial danger of a shortage of covered cars. There are now approximately 2,400,000 cars in the United States owned by the railroads. About 1,100,000 are hoppers, gondolas, and flat cars which handle traffic which is not injured by exposure to weather. The other cars are box, stock, refrigerator, cabooses and miscellaneous equipment.

A shortage of cars was averted last year by making use of open cars when there was no surplus of covered cars available. Eastern railroads were able to release covered cars for use on western roads for grain movement. This was possible because much of the traffic originating in manufacturing industries in the east was not moving in its usual volume. Automobile traffic was also light. The railroads accelerated their cars and train movement in this emergency, bringing their efficiency to the highest point it has yet reached.

There will be a heavy demand for covered cars this fall. Increased activity in manufacturing and a policy on the part of automobile manufacturers not to manufacture ahead of orders will render the situation acute. Moving the grain crop is always a problem for the railroads.

During the ten years preceding 1920 the population of the country increased 15 per cent and the revenue ton miles on railroads increased 62 per cent. During the decade preceding 1910 the population increase was 21 per cent, and the revenue ton miles increased 80 per cent. During the last ten years the railroads have added approximately 70,000 car units. Between 1916 and 1924 the average capacity of all cars increased from 41 to 43 tons, and the average tons per loaded car increased from 25 to 28 tons. The efficiency of the railroads, therefore, has increased especially during the last two years.

We are approaching a limit beyond which increases will be more difficult to accomplish. Last year's high point of efficiency in car movement will be difficult to exceed, and the best efforts of the railroads will be required to handle the situation this fall.

Mullins Body Corporation Opens Detroit Office

The Mullins Body Corporation of Salem, Ohio, is sending out announcements of the opening of a Detroit office, located in Room 5-139, fifth floor of the General Motors Building.

According to F. P. Mullins, vice president and secretary of the Mullins Body Corporation, his company is enjoying the largest volume of business in its history, with sufficient business already booked to keep his plant at capacity production during the first six months of this year.

The Detroit office will be under the management of Frank J. Burrows, who is well known in Detroit through many years of contact with the automobile trade. So much of the Mullins business is with the automobile industry, in connection with the stamping of metal bodies, hoods, fenders and general metal stamping, that the company has for some time felt the necessity of having a direct Detroit office to facilitate the execution of orders and to establish a quick and continuous contact between the factory and its Detroit customers.

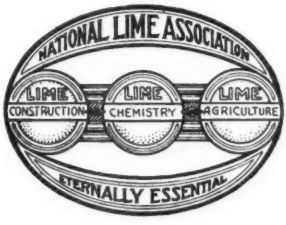
The metal stamping done for the automobile trade of Detroit is, however, but a part of the turn-over of the big Salem plant, which has had many years of experience in the manufacture of various lines of sheet metal work for a wide range of other industries. And not a small part of the energies of the corporation are devoted to the making of an extensive line of pressed steel boats, the popularity of which is growing by leaps and bounds.

Mr. F. M. Whitefield has been appointed district engineer in charge of Portland Cement Association work in Tennessee, with offices in the Baird-Ward building, 150 Fourth Avenue North, Nashville. Mr. Whitefield has been connected with the Portland Cement Association as field engineer since December 1, 1923. Prior to his connection with the Portland Cement Association he had filled various positions with eastern and southeastern organizations engaged in road and street promotion.

NATIONAL LIME ASSOCIATION

Seventh Annual Convention

BRIARCLIFF LODGE
at Briarcliff Manor, N. Y.
May 26, 27, 28, 29, 1925



Twenty-third Annual Meeting of Lime Manufacturers

National Lime Association
918 G Street, N. W.
Washington, D. C.

This page donated by Pit & Quarry

"WE BUY—REBUILD—SELL OR RENT"

CARS

12—Western 4-yd. 36-inch gauge, 2-way dump cars, completely rebuilt, all new wood, immediate delivery.

STEAM HOISTS

We have in stock over 100 Steam Hoisting Engines; single, double and triple drum; cylinder sizes ranging from 4¾x6 to 10x12.
Also complete line Swinging Engines and double drum Belt Hoists for Dragscraper work.

ELECTRIC HOISTS

We carry a large stock of Electric Hoists; American, Thomas and Lidgerwood; single, double and triple drum; A/C and D/C current.

CRUSHERS

1—No. 5 Austin Gyratory, standard drive.
1—No. 3 Telsmith Gates Gyratory Crusher.
1—12x36 Universal Jaw Crusher.
1—10x20 Climax Jaw Crusher on trucks.
1—9x14 Climax Jaw Crusher, on trucks, with elevator bins and engine.

CRANES AND DRAGLINES

1—Brownhoist Combination Crane and Dragline on caterpillars, 40′ boom, steam.
1—20-ton Browning 8-wheel Locomotive Crane, 50′ steel lattice boom, bucket operating, electric lights and outriggers. One year old.
1—Byers Auto Crane, steam, on traction wheels, 30′ boom.
1—O & S Locomotive Crane, 15-ton, 8-wheel, 40′ boom, M.C.B.
1—Industrial Locomotive Crane, 20 ton, 50′ boom, M. C. B.
2—Erie Combination Steam Shovel & Crane, on traction wheels. 1 on caterpillars.
1—Northwest model 104, 45 ft. boom, 1 yd. Page bucket, on caterpillars.

STIFF LEG DERRICKS

Large number of practically new American stiff-leg derricks.
Boom, 14x14x80 ft., trussed. Mast, 16x16x40 ft.
Legs, 14x14x62 ft. Bull Wheel, 16 ft.
For single line work or arranged for bucket operation.

Write for our New Stock List, No. 98

If you don't see listed what you want, write us. We may have it.

Equipment Corporation of America

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660 Land Title Bldg.
Phone Rittenhouse 5498

CHICAGO, ILL.
1460 Roanoke Bldg.
Phone Randolph 6586

Pittsburgh
860 Empire Bldg.
Phone Smithfield 1502

FOR SALE
DUMP CARS—Etc.

22—Standard Gauge 6 yd. capacity 2 way Dump Cars, Rebuilt with New Bodies, etc.

7—Standard Gauge 12 yd., capacity Dump Cars.

—STEAM SHOVELS—

1—Marion "21" on caterpillars, ¾ yd., with clam-shell and Dragline attachment: Used only 60 days since built, Overhauled.

Locomotives, Narrow and Standard Gauge, etc.

Southern Iron & Equipment Co.
(Est. 1889)

ATLANTA, GA.

FOR SALE OR RENT

STEAM SHOVELS

3—Erie B. Shop Nos. 143, 1064 and 1219, traction wheels, ¾-yd. dipper.
1—Model 21 Marion, caterpillar. Shop No. 4294, ¾-yd. dipper.
1—Type O Thew, Shop No. 1777, extra high lift, ⅔-yd. dipper, traction wheels.
1—18B Bucyrus, Shop No. 1870, traction wheels ⅞-yd. dipper.
2—70-C Bucyrus, Shop Nos. 1195 and 1197, 2½-yd. dippers.
3—70-ton Bucyrus Shop Nos. 939, 977 and 1233, 2¼-yd. dippers.
2—60C Bucyrus, Shop Nos. 1286 and 1388, 2½-yd.
1—45-C Bucyrus. Shop No. 1202. Railroad type, 1¾-yd. dipper.
2—Model 60 Marion, Shop Nos. 1301 and 2238, 2½-yd. dippers.
1—Model 75 Marion, Shop No. 2112, 2½-yd. or 4-yd. dipper.
1—Model 80 Marion, Shop No. 1312, 4-yd.
1—95-C Bucyrus, Shop No. 1235, 4-yd. or 5-yd. dipper.

STEAM SHOVEL PARTS

1—Boom for Marion 60 or 61 Shovel, length 35 ft., 22-ft. dipper arm, 1½-yd. dipper, long jack arms, etc.

SIDE DUMP CARS

62—16-yd. Western Air Dump Cars.
33—12-yd. Western Air Dump Cars, 19-ft. beds, box girder doors.
16—12-yd. Western Hand Dump Cars, 19-ft. beds, 60,000 lb. cap. trucks.
11—12-yd. Western Air Dump Cars, 19-ft. beds, box girder doors, vertical dump cylinders, 60,000 lb. capacity trucks.
11—12-yd. Western Air Dump Cars, Truss-Rod Doors, 26-ft. beds.
5—12-yd. Oliver Hand Dump Cars.
7—5-yd. K. & J. 36-in. gauge Side Dump Cars, steel draw sills and steel lined wood beds.
10—4-yd. Western 36-in. Gauge Cars.
7—4-yd. Koppel 36-in. Gauge Cars.
3—4-yd. Continental 36-in. Gauge Cars.
6—1½-yd. Western 24-in. gauge Side Dump Cars, with wood beds.

SPREADER CARS

2—Std. gauge Western Spreader Cars.
1—36-in. gauge Oliver Spreader Car.
1—36-in. Western Spreader Car.

LOCOMOTIVES—Standard Gauge

1—19x26 Baldwin 6-wheeled Switcher, with tender. Shop No. 48215. New 1918. Weight 62 tons. 180 lb. steam pressure.
1—19x24 Baldwin 6-wheeled Saddle Tank. Shop No. 49553, built 1918. Weight 67 tons, air brakes, 180 lbs. steam pressure.
1—18x24 Brooks 6-wheeled Switcher, with tender, Shop No. 1778. Wt., 50 tons.
1—17x24 Davenport 6-wheeled Switcher, with tender. Shop No. 1268. Steam pressure 180 lbs. Wt., 47 tons.
1—17x24 Schnectady 6-wheeled Switcher with tender. Shop No. 2956. Wt. 44 tons.
1—17x24 Porter 6-wheeled Saddle Tank, Shop No. 6065. Built 1918. Weight, 56 tons, 180 lb. steam pressure.
1—16x24 Vulcan 4-wheeled Switcher, with tender, Shop No. 1764. Steam pressure 180 lbs. Weight 40 tons.
2—16x24 Davenport 4-wheeled Switchers, with tenders. Shop Nos. 860 and 861. Steam pressure, 170 lbs. Wt., 38 tons.
1—16 x 22 C. M. & St. P. Ry., Class J-2. 4-wheeled switcher. Weight 32 tons.
1—13x18 Vulcan 4-wheeled Saddle Tank. Shop No. 3163, air brakes and air dumping arrangement. Steam pressure 180 lbs. Wt., 32 tons.
1—13x18 American Saddle Tank. Shop No. 55248, built 1916. Wt. 32 tons.
1—11x16 Vulcan 4-wheeled Saddle Tank. Shop No. 757. Wt., 20 tons.
1—11x16 Davenport 4-wheeled Saddle Tank Locomotive. Shop No. 1027. Wt. 20 tons. Steam brakes.

42-IN. GAUGE

1—11x16 Vulcan 4-wheel Saddle Tank. Shop No. 3085. Steel cab, A.S.M.E. boiler, 165 lb. pressure.

36-IN. GAUGE

2—11x16 Porter Dinkies, Shop Nos. 6717 and 6718. New in 1922. Wt. 21 tons.
1—9x14 Vulcan Dinkey. Shop No. 1675. Weight 14 tons.

24-IN. GAUGE

1—7x12 Davenport Dinkey. Shop No. 1202. Weight 9 tons.
1—7x12 Vulcan Dinkey. Shop No. 2345. Weight 9 tons.
1—6x10 Davenport Side Tank Dinkey. Shop No. 1307. Wt. 7 tons.

DRAGLINE EXCAVATORS

3—Class 24 Bucyrus Steam, Shop Nos. 3445, 3500 and 3671, skids and rollers, 85-ft. to 100-ft. booms; 3½, 4½ or 5-yd. Page buckets.
1—Class 20 Bucyrus, steam. Shop No. 813, skids, 85-ft. boom, 3-yd. Page bucket.
2—Class 14 Bucyrus, steam. Shop Nos. 3387 and 748, caterpillars. 60-ft. booms, 2-yd. Page buckets.
1—Model 210 P & H, gasoline, Shop No. 1077, New 1920, 48-ft. boom, 1¼-yd. Page bucket, caterpillars.

CRANES

1—Erie B Crane, Shop No. 1064, 32-ft. or 36-ft. boom, ⅝-yd. Williams clam, traction wheels or standard gauge truck.
1—20-ton McMyler, 8 wheeled, Shop No. 388, 45-ft. boom, 1¼-yd. O. & S. clam.
1—Gantry Crane. New in 1919; 48-ft. boom, 15-ton cap. at 18-ft. radius; 7-ft. 10½-in. gauge, 12-ft. wheelbase, self-propelling. Base of boom 17 ft. above track. Bucket-operating drums. Wt. 50 tons.

MISCELLANEOUS

1—10-ton Austin Gasoline Road Roller.
1—8-ft. Austin Giant Road Grader.
1—6x10 D.C., D.D. Lidgerwood Hoist, with 36x90-in. boiler.
1—6½x10 D.C., D.D. American Hoist, with butt strapped boiler.
1—7x10 D.C., D.D. Lambert Hoist, without boiler.
1—7x10 D.C., D.D. Flory Hoist, without boiler.
1—¾-yd. Page Dragline Bucket.
2—1½-yd. Page Dragline Buckets.
1—1½-yd. Brown Hoist Clam Shell Bucket.
4—Mead-Morrison 1½-yd. Clam Shell Buckets.
2—1¼-yd. O. & S. Coal Loading Clam Shell Buckets.
1—1-yd. Owen Clam Shell.
1—100-hp. Nagel Boiler, A.S.M.E., 125-lb. steam pressure.
1—54-in. Upright A.S.M.E. Boiler, 125-lb. steam pressure.

CLAPP, RILEY & HALL EQUIPMENT CO.
14 SOUTH CANAL STREET, CHICAGO

FOR SALE OR RENT

MODERN CONSTRUCTION EQUIPMENT

This equipment is owned by us and is ready for immediate inspection at our shops in Chicago. A partial list of our stock. Send for complete list.

CRANES

1—Northwest Crawler, 40′ Boom wih Climax Heavy Duty Engine.
1—Marion Gas Electric Model No. 21. 35′ Boom; also dipper stick and ½ yd. shovel.

DRAGLINES

1—Monighan, Boom 60′ with 20′ extension, 2½ yd. bucket, tractions, skids and rollers. New 9x10 engine—75 HP. Johnson Boiler.

CARS

63—Western—12 Yard Dump Cars. Standard Gauge.
55—Atlas—Two-way Dump Cars, size 1 yard, 19⅝″ gauge.
14—French Panama—Two-way Dump Cars, size 1 yd., 19⅝″ gauge.
81—French Panama—One-way Dump Cars, 1 yd., 19″ gauge.
8—Koppel—End Dump Cars, ½ yd., 14″ gauge.
1—Koppel—Batch Car, ½ yd. 14″ gauge.

HOISTS

One—1 Lidgerwood D.C., D.D., 9x10 Skeleton Hoist, mounted on skids.
Five—5 Thomas, Type P-679, Direct Connected Single Drum Hoists, equipped with 7½ HP., 3 Phase, 60 Cycle, 220 Volt G. E. Motors, Solenoid Brakes and Reversible Control.

LOCOMOTIVES

3—American 50 ton, 6 wheeled Switchers, cylinders, 18x24 in.; drivers, 44 in. center.
2—Baldwin—50 Ton, 6 Wheeled Switchers, cylinders, 18x24 in.; drivers, 44 in. center.
1—Davenport Steam Dinky—14 ton, 36″ gauge.
1—Porter Steam Engine—15 ton, 36″ gauge.
2—Milwaukee Gasoline Dinkys—Type F-30 C, 24″ Gauge, 6 ton—Equipped with Buda Motors.

BOILERS

1—25 HP. Upright Boiler, mounted on wheels.

PUMPS

4—Barnes High Pressure Force Pumps, size 5½x6, equipped with 7½ HP., 3 Phase, 60 cycle, 220 Volt Ideal Motors.
7—Gould Triplex Pumps, size 7x8.
3—Gould Triplex Pumps, size 5x8.
*On all Gould Pumps we can supply 3 phases, 60 cycle 220 volt motors, strating apparatus, belting, etc.
1—2″ Nye Steam Pump.
1—4″ Nye Steam Pump.
1—″ Nye Steam Pump.
2—6″ Centrifugal Submerged Pumps, mounted on steel frame and equipped with 30 HP., 3 Ph., 60 C., 220 Vt., 900 RPM. Vertical motor.

MOTORS

60 Cycle, 3 Phase, 220 Volt

1—40 HP. General Electric, 900 RPM.
3—30 HP. General Electric, vertical, 900 RPM.
1—25 HP. Fairbanks, 1140 RPM.
1—20 HP. Wagner, 1200 RPM.
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1	35	G. E., form K, to American, single stage centrifugal pump	870
1	35	G. E., form K	720
1	40	Westinghouse, type CW, slip ring	1160
1	40	Wagner, type BP	1140
1	40	Westinghouse, type CS	870
1	40	Westinghouse, type CS	695
1	40	Westinghouse, MW, slip ring	850
5	40	Westinghouse, CX	580
1	50	Fairbanks-Morse, type BV slip ring	1200
1	50	Allis-Chalmers, type AN	1160
1	50	G. E., type I, form M, slip ring	700
1	50	Westinghouse, type CS	870
1	50	Allis-Chalmers, type AN	850
1	50	Westinghouse, HF, slip ring	680
1	75	G. E., form K, 2300 v.	1800
2	75	G. E., type I, form M, slip ring	860
1	75	G. E., form K	600
1	75	Westinghouse, type CW, slip ring	435
1	100	Westinghouse, type CS	870
1	100	Allis-Chalmers, slip ring, 2200 v.	865
1	100	Westinghouse, type CW, slip ring	865
2	100	Westinghouse, type CW, slip ring	350
1	125	Fairbanks-Morse	900
1	150	Allis-Chalmers, 2200 v.	580
1	250	Westinghouse, type C	850
1	250	Fairbanks-Morse, type HV ball bearing, slip ring	600
2	250	G. E., type I, form M, slip ring	385
1	300	G. E., type I, form M, slip ring	1200

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Qu.	H.P.		Speed
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1	10	Westinghouse, type HF, slip ring	715
3	10	G. E., type I, form M, slip ring	750
4	10	Wagner, type BP, new	750
1	15	Watson, type KH	720
1	20	Fairbanks-Morse, type B	750
2	20	Wagner, type BM	710
4	20	G. E., form K	750
1	25	G. E., form K	750
1	30	Fairbanks-Morse	750
1	30	Allis-Chalmers, AN	720
2	35	G. E., type I, form K	750
1	35	G. E., type I, form M, slip ring	750
1	37	G. E., MTC, hoist motors	750
1	40	G. E., form K	1500
1	40	G. E., form K	750
1	40	Allis-Chalmers, AN	750
1	50	G. E., form K	1500
2	50	Allis-Chalmers, type AN	750
1	50	Fairbanks-Morse, type B	750
1	50	G. E., type I, form M, slip ring	750
1	60	Allis-Chalmers, type AN	720
2	60	G. E., form K	720
1	75	Westinghouse, CI, hoist, motors	500
1	100	Westinghouse, CW, slip ring	750
1	100	G. E., type I, form M slip ring	750
1	100	Wagner, type BR, slip ring	710
1	112	G. E., ITC, form M, slip ring	710
1	125	G. E., form K	500
1	150	G. E., type I, form M slip ring	750
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1—60 H.P. Muncie Oil Engine complete with all auxiliary equipment. This engine was bought new.
1—8" Erie Type HHD Centrifugal Dredge Pump complete with vacuum and pressure gauges, inside flap valve, ejector and one spare runner or impeller.
1—8"x4' Suction Hose Coupling, nearly new.
2—8"x2' Discharge Hose Couplings.
1—8"x4' Discharge Hose Couplings.
1—Sauerman 1 Yard Drag-Line complete with 600 ft. of 1⅜" Cableway Cable. No hoist engine.
This machinery, used about sixty days, has been well cared for, and is as good as new.

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PINE BLUFF, ARK.

FOR SALE BY OWNER

1—100 KW Generator, 3 ph., 60 cy., 440 volt, 900 RPM belted to Ames center crank steam engine.
1—Locomotive Crane, Little Giant, steam, traction, ¾ yd. bucket, 35' boom.
1—Sullivan horizontal Air Compressor, 100 C.F. cap.

BETTENDORF STONE COMPANY
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40-C BUCYRUS SHOVEL

Overhauled ready to go to work. Any reasonable offer will be accepted. Can be inspected near Minneapolis.

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425 South 5th St., Minneapolis, Minn.

FOR SALE

Bucyrus 14 Cat. dragline; 2—2-yd. Page buckets; Marion 37 Cat. shovel—1¾-yd., new 1922; Bucyrus 225 B 6-yd. stripper, new 1921; Bucyrus 5-163-110 C Railroad shovels; 10 new 70-ton steel hoppers—10—50-ton ballast; 2—2-yd. Page buckets; 2—2-yd. Clam shells.

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T. H. LETSON CO.
Good Used Equipment — Hudson Terminal Bldg. NEW YORK — Clean Business Methods

BOILERS

2—Each 60, 80 and 90 H.P. Fire Box Portable These are ASME 125-lb. Boilers.

CRUSHING PLANT

Cost $98,608.91—Used 2 years—Price $21,000.00 Crushers, Screens, Dump Cars, Track, Locomotive, Steam Shovel, Compressor, Drills, Motors, complete.

GRAVEL PLANT

1-yd. Sauerman Cableway with 75 H.P. Elec. Hoist. Screens, Pumps, Crusher, Motors, etc., complete.

MISCELLANEOUS

1—6-ton, 24" ga. Burton gaso. loco. NEW $1500.00, 9" & 12" Galv. Spiral Riveted Pipe like new, half price.
1—Marion "30" Steam Shovel, large wheels, rock dipper, 160-lb. pressure boiler, fine shape $3000.00.

Send me your inquiries.

ALEXANDER T. McLEOD
First National Bank Bldg., Chicago, Ill.

1200 TONS
35 POUND
NEARLY NEW

ZELNICKER IN ST. LOUIS

And All Other Weight Rails

FOR SALE

1—Stroudsburg portable hoist, 5 H.P. D.C. motor. 1—Brown Hoist, 2 cylinders, 10½x 12"—2 parallel drums 42x21 and 40x22. 2—Ingersoll-Rand class 11 vertical duplex belted compressors 11x9", 188 cu. ft. 5—Root Blowers, size 30B-3" openings. Also ball mills, crushers, pulverizers, etc.

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All sections, new and second hand. Centrally located. Also Cars of all kinds. Immediate shipment guaranteed.

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Hanson Concrete Roofing Tile Machine with necessary Palates. First Class Condition —Used Only Two Days.

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One Model 75 Bucyrus Railroad Type Steam Shovel, 2½ yard dipper, in first class condition. $3500.00 f. o. b. New Ulm, Minnesota.
One large friction type car puller with 25 H. P., 220 volt motor and belt.

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—CONTRACTORS—
HOFFMAN BROS.

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WE DRILL FOR FIRE CLAY, LIMESTONE, SOAPSTONE, GYPSUM, ROCK SALT AND ALL OTHER MINERALS USING DIAMOND CORE DRILLS

POSITION WANTED

As dredge runner on suction type dredge preferred. Applicant is fully experienced and is open for immediate engagement. Inquiries from dredge operators solicited. Address Box 18, PIT and QUARRY, 538 S. Clark St. Chicago, Ill.

PUNXSUTAWNEY DRILLING & CONTRACTING CO.
PUNXSUTAWNEY, PA.
Diamond Drill Contractors
Testing fire clay, limestone and other mineral lands, using double core barrels.

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Have patent on gravel washer—one that will wash gravel at minimum cost—easily transported, can be attached to any revolving screen. If interested write Box 179, R. F. D. 2, Robbinsdale, Minn.

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Experienced gravel pit man to operate small pit in Indiana, with view to increasing production. Reply should state age, experience and salary desired. Address Box 50, Pit and Quarry, 538 S. Clark St., Chicago, Ill.

POSITION WANTED—Gravel Plant Supt. Qualified to handle any type of operation and office and sales as well. Fourteen years' experience from shovel runner to general supt. covering Dragline, Dredge, Slackline and Shovel operations. An opportunity to secure a technically trained, yet practical man. Available soon. Address Box 47, PIT and QUARRY, 538 S. Clark St., Chicago, Ill.

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Equipment that You Have No Further Use For?

Someone of the thousands of other plants in the country might be wanting just what you do not want. Advertise it in PIT and QUARRY. Send us a description of the equipment you want to sell, and we will tell you promptly how much advertising space you should use and what it would cost you. No obligation on your part whatever.

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Rails Frogs and Switches

No Order Too Large — None Too Small —

FOR SERVICE COME TO HEADQUARTERS

KOPPEL INDUSTRIAL CAR AND EQUIPMENT COMPANY

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Disc Crushers

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WE LOOK INTO THE EARTH

By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.

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DRILLING CONTRACTORS
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Steam-Electric-Gasoline
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for driving excavating machinery by

Oil Engines

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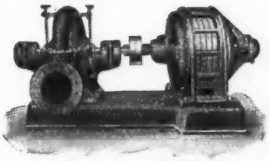

Capacities 25 to 4,000 Gallons per minute.

Single Stage High Head High Efficiency Centrifugal

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SWABY

Gravel and Dredging Pumps

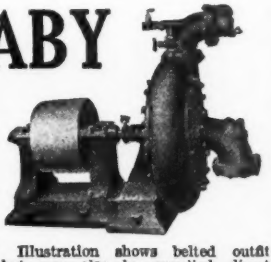

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Illustration shows belted outfit but can also be supplied direct connected to Vertical Engine upon same base.

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PROMPT SHIPMENT

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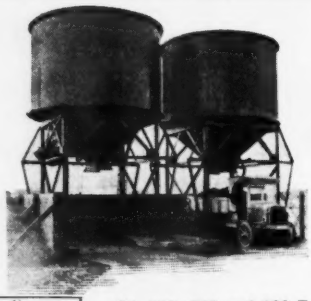

85, 135, 210 and 300 Ton Capacities.

All-steel-hopper-bottom-self-cleaning.

Equipped with a no-jam gate.

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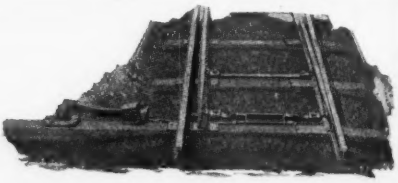
BLAW-KNOX



Helmick Switches and Welded Riveted Plate Frogs

Many a locomotive and quarry car has come to grief on poor switches. The time and cost of putting derailed locomotives and cars back on the track can be greatly reduced through the use of Helmick improved switches and frogs.

Our catalogue contains complete details of Helmick Track Equipment. Write for a copy.

HELMICK FOUNDRY-MACHINE CO.
Fairmont, W. Va.

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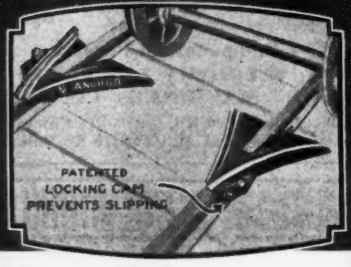

GETS 'EM BACK ON THE TRACK

You should carry a pair on every locomotive.

Why?

Because they pay for themselves in a week by the time they save you.

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DAKE SWINGING ENGINES

PRODUCE
Quicker Swings
More Work
Less Trouble

The experience of use has proven them—That's why they are so universally used on bull wheel derricks.

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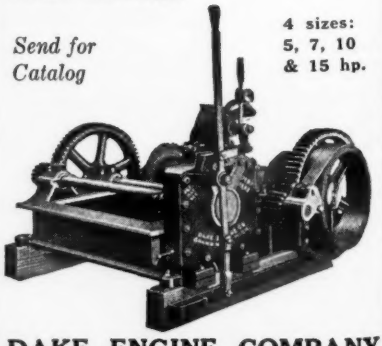
4 sizes: 5, 7, 10 & 15 hp.



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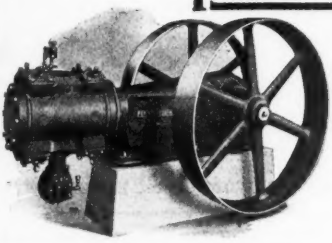
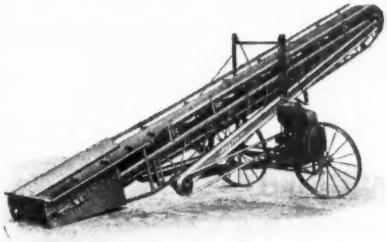
PENNSYLVANIA



He told us frankly: "It is the best all around air compressor I have ever seen or had anything to do with." This was said of a PENNSYLVANIA Air Compressor.

Let us quote on one of this kind or send you **Bulletin No. 123.**

PENNSYLVANIA PUMP & COMPRESSOR CO.
Main Office and Works: Easton, Pa.



Especially intended for handling gravel, stone, sand, and similar materials

Austin Portable Conveyors

Made in two styles and all lengths between 16 and 68 ft. Furnished without power, or with gasolene or electric drive. Unmounted, or with 2 or 4 wheeled trucks as length requires. Write for special literature and prices.

Austin Manufacturing Co.
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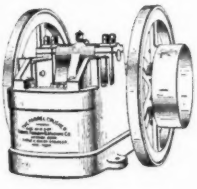
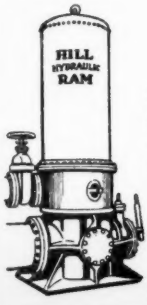


"FARREL" CRUSHERS
—World Famous—

Thousands in use on the hardest rock. Built in all sizes, 6″x3″ to 60″x48″. Complete rock crushing plants designed and equipped, also sand and gravel, washing and screening plants.
Send for latest bulletin E.

Earle C. Bacon, Inc., Engineers, 26 Cortlandt St., New York



WASH GRAVEL WITHOUT PUMPING EXPENSE

If there is a stream in your neighborhood to furnish water power, pump with a

HILL HYDRAULIC RAM

Made in 12 sizes
Write for Free Catalogue

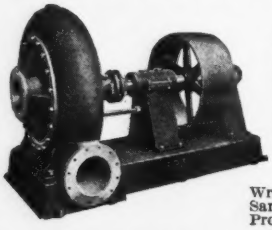
Johnson Mfg. Co.
301 Holly St., Seattle, Wash.

TERRY DERRICK FITTINGS

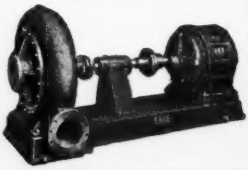
For General Construction and Material Handling

AMERICAN-TERRY DERRICK CO.
Pennsylvania and Jacobus Aves.
SOUTH KEARNY, N. J.

"ERIE"—The High Standard in Dredging Pumps



The well-known ERIE MAKE has been recognized as standard by engineers and operators since 1889. ERIE Pumps have been put to work in thousands of Sand and Gravel Pits and Quarries all over the world and stand for results in every pumping operation. Use ERIE Pumps and you will be assured of satisfactory performance.



Write us today for 24 page Bulletin containing valuable information on Sand and Gravel Pumping. At the same time submit your Pumping Problems to us for expert advice. No obligation on your part whatsoever.

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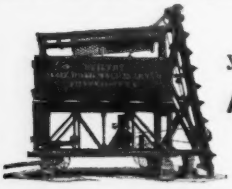
Profits From Acme Equipment

Acme equipment is of that steady, sturdy, efficient kind that gains and holds favor in the pit or quarry purely on the basis of performance. Practical men know Acme screens, crushers, pulverizers and portable crushing and screening plants for what they're worth—*and use them.*



If you want equipment reliability, you want *Acme equipment.*

ACME ROAD MACHINERY CO.
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Main Office and Factory—Frankfort, N. Y.
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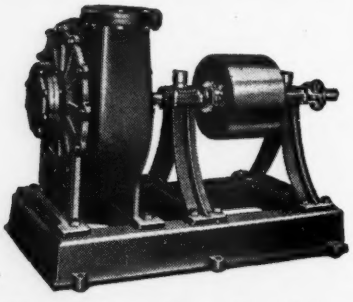
LIGHTNING PUMPS



Buy Wearing Quality

Lightning Sand and Gravel Dredging Pumps have unusual wearing quality. There are additional features that give them unusual power—features that give the operator better pumping service, smooth operation, large capacity, simplicity of design, strength, high percentage semi-steel wearing parts.

A full description of these rugged pumps will show you why they are the right pumps for your purpose. Send for full information.

KANSAS CITY HAY PRESS CO.
KANSAS CITY, MISSOURI

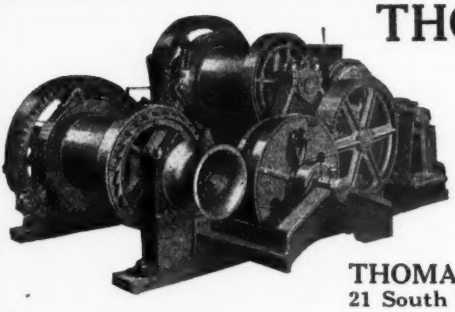
—New Holland—

Powerful Stroke— Great Capacity

Designed to crush all kinds of quarried rock into any size down to dust. Powerful in stroke, with great capacity, New Holland crushers are economical and reliable. They run easily, have no hot bearings and produce the least possible dust. Made in five sizes.

Write for our catalogue on crushers, elevators and screens.

New Holland Machine Co.
Franklin Street, New Holland, Pa., U. S. A.



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For Slackline Cableways, Drag Scrapers or any other class of service where two speeds and two capacities are required.

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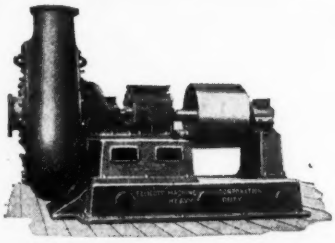
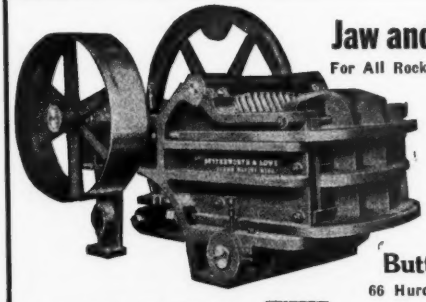


Fig. 334—Heavy Duty Dredge Pump
Send for Bulletin 2521

ELLICOTT MACHINE CORPN.

Baltimore, Maryland, U. S. A.

HYDRAULIC DREDGES
SAND AND GRAVEL DREDGES
DREDGING MACHINERY
SAND AND GRAVEL PUMPS



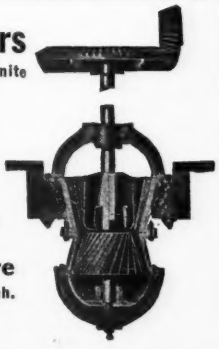
Jaw and Rotary Crushers

For All Rocks and Ores Softer Than Granite

GYPSUM MACHINERY

We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

SPECIAL CRUSHER-GRINDERS FOR LIME



Butterworth & Lowe

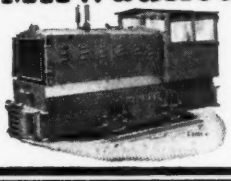
66 Huron Ave., Grand Rapids, Mich.

Nippers—17x19", 18x26", 20x30", 24x36" and 26x42"

Rotaries—20" to 47" inside diameter. Many variations.

Milwaukee Gasoline Locomotives

For Industrial Haulage



BUILT in sizes from four to fifteen tons. For all Gauges of Track. There's a size for every purpose.

Write for Catalogs M-129 and M-136.

MILWAUKEE LOCOMOTIVE MFG. CO. MILWAUKEE WISCONSIN

When the service demands are hardest

It is during the rush periods, when the demands on your conveyor are excessive that the superiority of the frictionless, smooth operation and strength of Conweigh Idlers is most apparent.

The seven following features are important factors in Conweigh Idler efficiency:

A Hardened steel "Cone," fitted on turned steel shaft.

B Pressed steel "Ball Retainer."

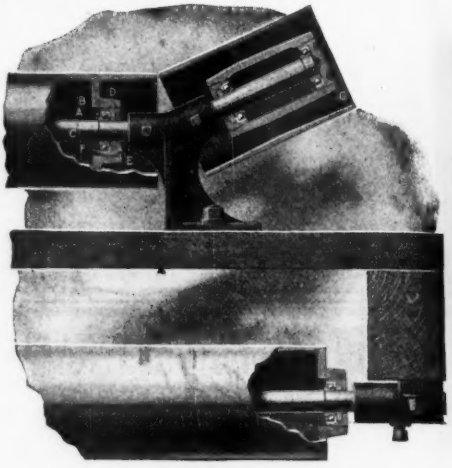
C Turned steel shaft, set screwed in Idler brackets.

D Oiled washer of felt or carded wool.

E Hardened steel "Plug," screwed into pulley hub.

F Brass plug for lubrication.

G Lock screw to prevent hardened plug from turning.



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THE CONVEYING WEIGHER COMPANY

90 West Street — ENGINEER & CONTRACTOR — New York

EASTON QUARRY CARS

Knowledge

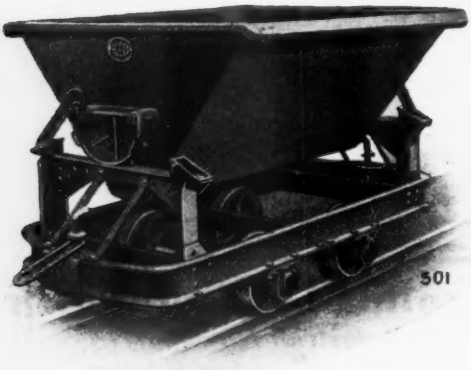

FIG. 501. UPRIGHT POSITION

In purchasing quarry cars there are only four kinds of factories to choose from.

A Those who know not and know not they know not.

B Those who know not and know they know not.

C Those who know and know not they know.

D Those who know and know they know.

Bulletin 21 shows other types of quarry cars.

"Quarry Car Practice" published every now and then.

EASTON CAR & CONSTRUCTION CO.

EASTON, Pa.

New York Philadelphia Pittsburgh
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It Crowds

It's Self-Feeding

The savings made with a Specialty Fordson Loader will soon pay for the machine and add many a dollar to your profit.

It is a self-feeding, crowding machine, responsive to the will of the operator, is fast and sturdy.

Write for bulletin, or see any Ford Dealer.

SPECIALTY ENGINEERING COMPANY

Allegheney and Trenton Aves.

PHILADELPHIA, PA.

The logical pipe for quarry service

EVERY piping requirement of quarry or sand and gravel service is economically met by Taylor Spiral Riveted Pipe. It is uniform and accurate in construction; light, yet possessing heavy pipe qualities, and strong enough to stand up under any service. The ease with which it can be handled and transported to remote localities due to its light weight, is a factor deserving special consideration.

Each length is fitted with unbreakable forged steel flanges—flanges that cannot be broken in shipment, in installation, or in service. Our 88 page "production book" tells the complete story of Taylor Products. Ask for it.

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TAYLOR *Spiral Riveted* PIPE

P & Q 5-11-RTG

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"TRENTON"
DREDGE CHAIN

Better and More Economical

The difference between Woodhouse Chain and "chain" lies in the metal used, and in the way it is Hand-manufactured. Made of selected metal by expert workmen, Woodhouse Chain comes from the welding process with the fullest strength possible.

Economy results from this wrought-in quality by the elimination of time losses from breakdowns. Experienced operators of shovels and power excavators know the importance of good chain, and therefore know the value of Woodhouse Chain.

Why Woodhouse Chain is better is told in our booklet, mailed free on request. Send for it today.

Specify Woodhouse Chain.

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WOODHOUSE CHAIN WORKS,
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Send me a copy of your testimonial pamphlet.

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FORDSON LOADER

THE ONLY
Fordson Loader on Wheels
that
CROWDS
WHILE ELEVATING
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SAVES MONEY IN
Sand and Gravel Pits
Material Dealers' Yards
Handling Concrete Material

Operator stands at one side with clear view of all operations.
Cuts a wide, level path, at any grade desired.
Swivel spout permits side or end loading of trucks.
Moderate Price.

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210 40th St., Brooklyn, N. Y.

For Washing Stone, Sand and Gravel

The McLanahan Improved Double Log Washer, introduced many years ago, is the most successful and complete machine ever built for washing and preparing phosphate rock, limestone and gravel. It embraces all the good qualities of the submerged log with none of the disadvantages of the scoop.

McLANAHAN STONE MACHINE CO.
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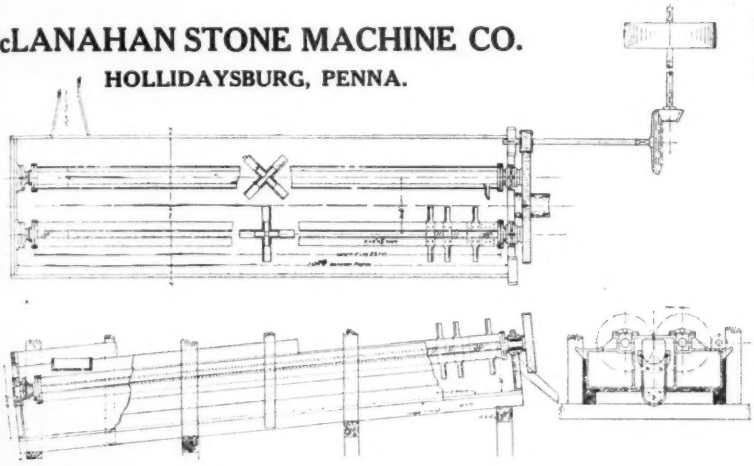

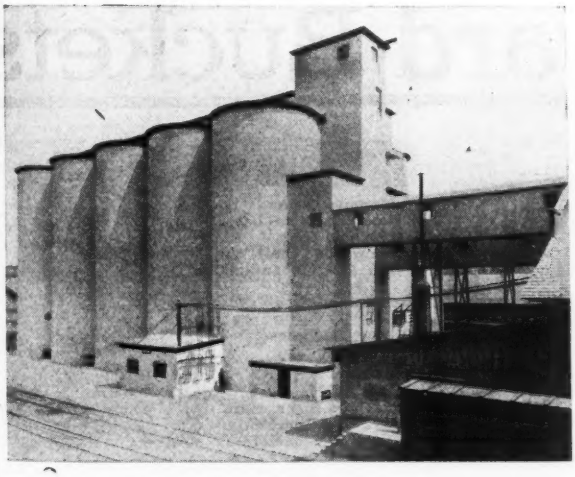

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OPERATES ONE HALF YARD SHOVEL-CLAM-DRAGLINE

Shipped Assembled

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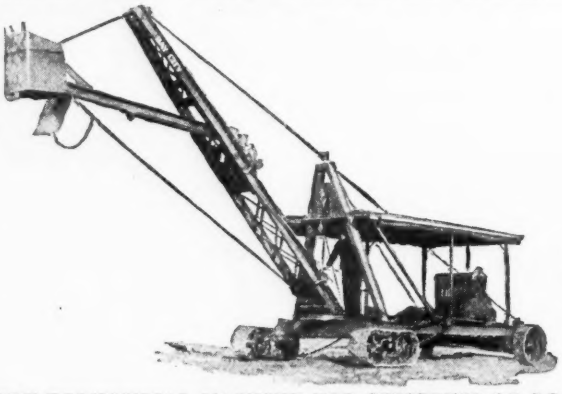

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Several Hundred in Operation

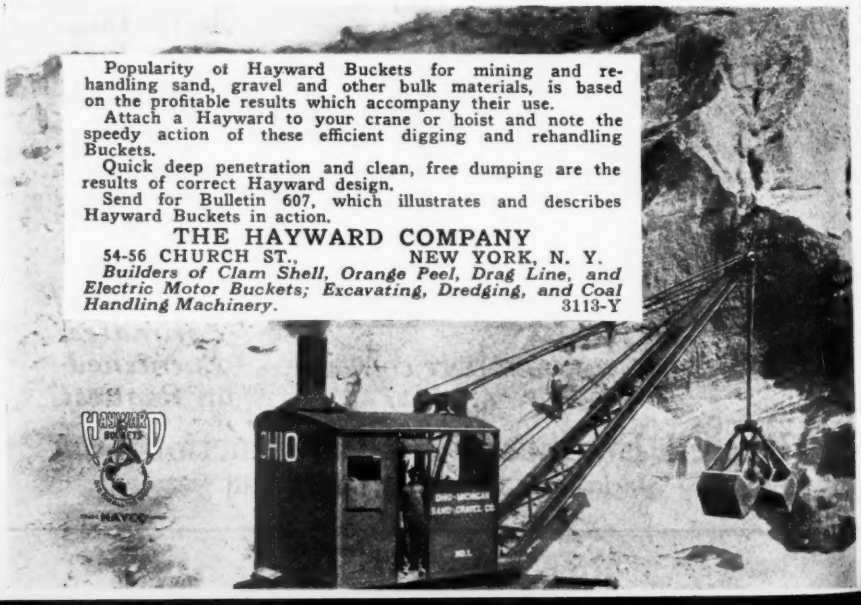
A STURDY ECONOMICAL MACHINE FOR STRIPPING OR LOADING

For larger jobs—the Bay City ¾-yd. 16B. Also Long Boom Bay Cities in 1 and 1½ yard capacities. There's a Bay City for every size plant. Several plants have purchased their 2nd and 3rd Bay City.

BAY CITY DREDGE WORKS **BAY CITY, MICH.**

See P&Q **HAND BOOK** Page 333

Hayward Buckets



Popularity of Hayward Buckets for mining and re-handling sand, gravel and other bulk materials, is based on the profitable results which accompany their use.

Attach a Hayward to your crane or hoist and note the speedy action of these efficient digging and rehandling Buckets.

Quick deep penetration and clean, free dumping are the results of correct Hayward design.

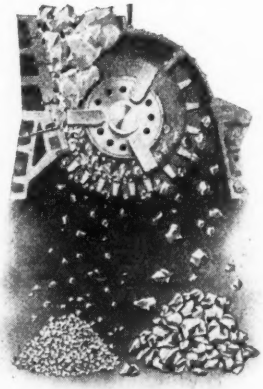
Send for Bulletin 607, which illustrates and describes Hayward Buckets in action.

THE HAYWARD COMPANY

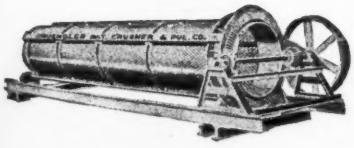
54-56 CHURCH ST., NEW YORK, N. Y.

Builders of Clam Shell, Orange Peel, Drag Line, and Electric Motor Buckets; Excavating, Dredging, and Coal Handling Machinery. 3113-Y

Gruendler Service is Efficient, Productive and Economical—



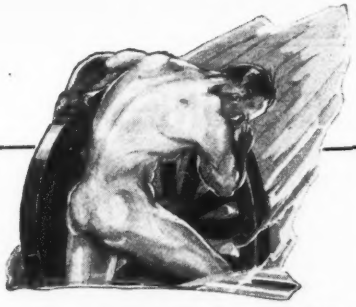
That is what operators say whose plants are Gruendler Equipped. Less labor, less equipment, greater tonnage, and uniform product are secured at lowest cost per ton. Gruendler crushers, revolving screens, elevators, hoists, and plant design have solved the producers' production problems.



Plants in any capacity from 3 to 6,000 tons daily. They are the result of experience and knowledge. Their exceptional ruggedness assures year 'round consistent performance with minimum upkeep.

Gruendler equipment and service will solve *your* production problems too. Consult with our engineers who will gladly analyze your crushing or pulverizing problem.

Gruendler Patent Crusher & Pulverizer Co.
908 North Main St.
ST. LOUIS, MISSOURI



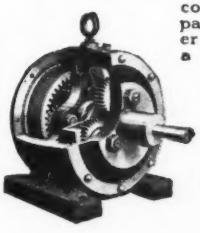
YOU WOULD NOT GRASP A WHEEL BY THE HUB TO TURN IT!

If you want to move a heavy weight—a long lever is the easiest way. If you want to turn a heavy wheel—you grasp it at the rim—not the hub. Why?—Because you get maximum effect from the power supplied.

The Principle of the IXL Speed Reducer

The Patented Feature underlying the IXL Speed Reducer is based on this fundamental principle. The power that moves the slow speed shaft is applied at the point of greatest leverage. This reduces the load on the gear teeth to the minimum.

The many uses of the IXL Speed Reducer for saving labor and space, for eliminating danger and inefficiency are fully covered in our 79 page Speed Reducer Book. There's a free copy for you—just clip the coupon, and attach to your letterhead.



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Whatever success Cyclone No. 14 Big Blast Hole Drills have attained in the quarry industry during the fifteen years of their existence has been due to close adherence to the following ideals and principles:

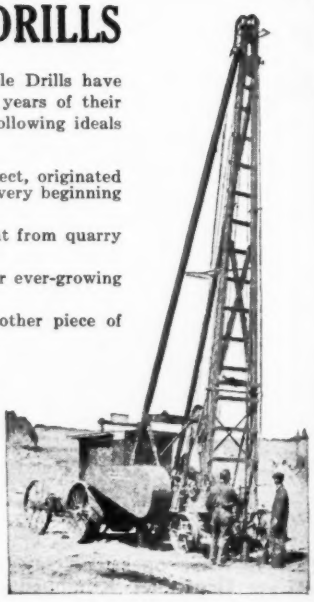
1—Starting with a design that was basically correct, originated after a close study of the requirements at the very beginning of the use of well drills in quarrying.

2—Always welcoming suggestions for improvement from quarry operators.

3—Keeping in close touch with the field and their ever-growing requirements.

4—Never holding the idea that a drill or any other piece of machinery could be perfect or faultless.

The story of the development of Cyclone No. 14 drills is completely told in our 100-page catalog B-45. It also contains 40 pages of cost and operating data on quarry drilling and blasting. Ask for a copy.



THE SANDERSON-CYCLONE DRILL CO.

Orrville, Ohio

Eastern & Export Office:
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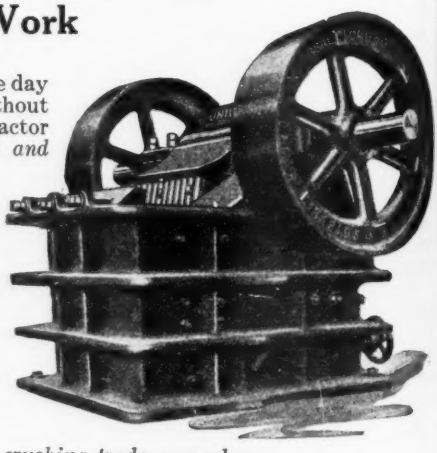
Day after Day, The Year Around Universal Crushers Work

The crusher that will handle big tonnage day after day and do it economically without breakage and delays, is an important factor to consider. It means *bigger output and lower costs.*



All Steel frames combine strength and lightness. Six large opening general crushers with capacities to 450 tons per day. Six gravel and rejection crushers with capacities to 150 tons per day to pass a 1 inch ring. There is no stone too hard for these crushers.

From more than 20 sizes we can recommend a crusher just suited to YOUR job. Either stationary or portable with or without elevators and power.

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UNIVERSAL CRUSHERS

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Sweet's Rails, Steel Ties and Track Accessories are made from the ground up in our own rolling mills. We control the quality and the design. Nothing leaves our plant without careful inspection and assurance of the user's complete satisfaction.

Keep us posted regarding your track needs.

Ample stocks of the highest grade materials enable us to make prompt deliveries no matter where you are located.

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SWEET'S STEEL COMPANY

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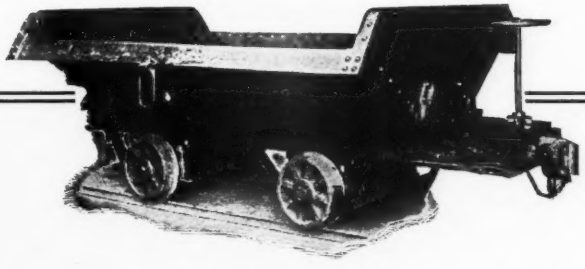

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Under Most Abusive Loading Conditions

ATLAS CARS are designed to reduce haulage costs and last longer

"They do both—Why not Investigate"

Engineering Service Especially Developed in Quarry Car Design

THE ATLAS CAR & MFG. CO.

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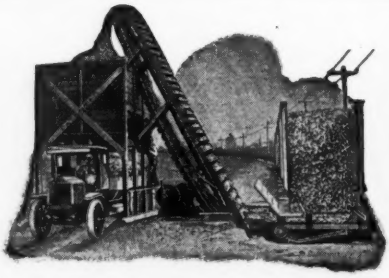
Quarry Cars, Rocker and Gable Bottom Cars, Special Cars of All Kinds

Here's What We GUARANTEE

When equipped with proper size feeder, the SUNBURY Automatic Unloader



Will load or unload a 50-ton car in 90 minutes!

The SUNBURY Automatic Unloader

And one man can handle it. The first cost is reasonable and its return from the standpoint of its being able to substantially increase your profits makes it a very profitable investment.

Its automatic feature is important and will commend it to you. It is simple in construction, strongly built and economical in operation.

We will be pleased to send you an illustrated descriptive circular.

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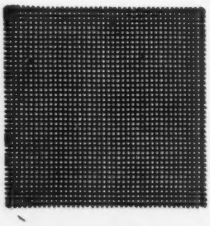
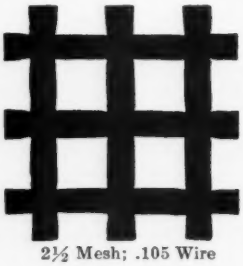
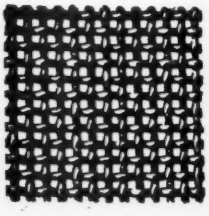


40 Mesh; .0135 Wire



2½ Mesh; .105 Wire



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Uniform fineness and long service will be assured by its use in screening SAND, GRAVEL, CRUSHED STONE AND CEMENT.

Large stock always on hand; special mesh manufactured to suit requirements at right prices.

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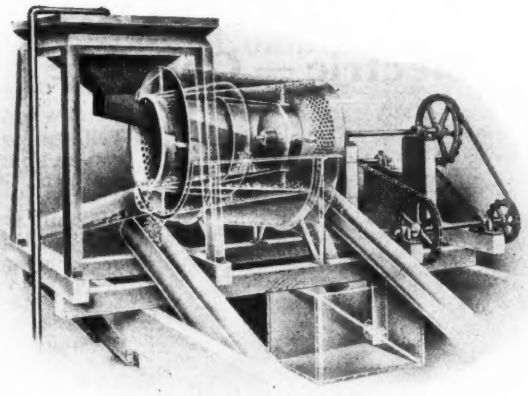

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Patented
SCREENS

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Reduced cost in plant structure—lower first cost of equipment and big saving in operating expense leave you a wider margin for profit.
Let us tell you how to secure these results and at the same time produce a better quality of aggregate than is possible by other methods.

Write us for detailed information and plant layouts.

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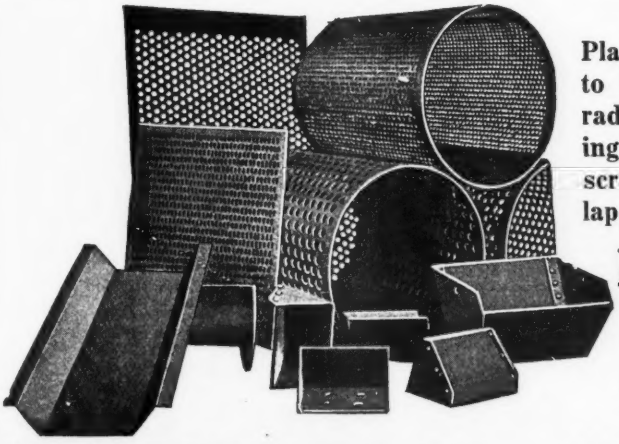
Perforated Metal Screens
FOR STONE, SAND, GRAVEL, ETC.



Plates flat; rolled to diameter or radius for revolving and conical screens butted or lap joints.

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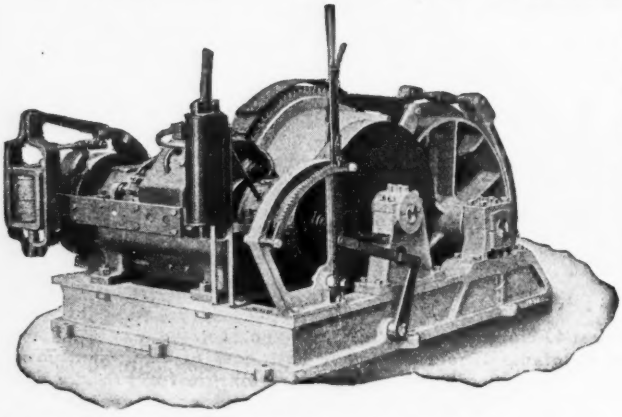

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Our Engineers will consult with you at any time.

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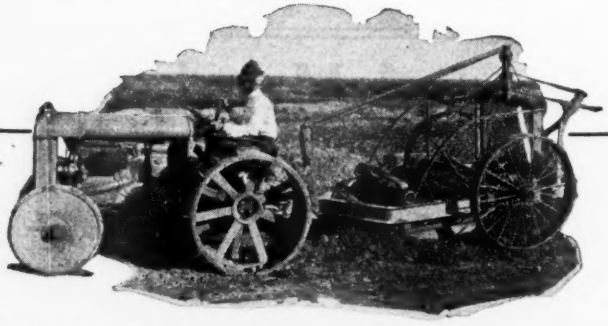

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Put a MIAMI (one-man) POWER SCRAPER on your stripping or dirt-moving job and cut your costs in half. One man will move one hundred yards every day a distance of two hundred feet or four hundred feet round trip. The total cost including interest, depreciation, gas, oil and operator is less than twenty cents a yard.

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Reg. U. S. Pat. Off.

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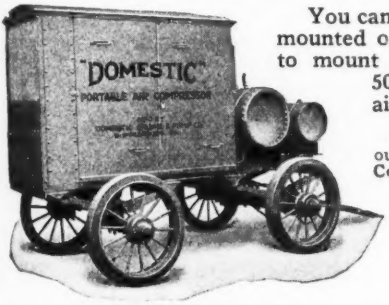
"DOMESTIC" Compressors cut time and cost

That is what every stone quarry operator wants—better service with less expenditure of time and money. As a means to accomplish this sort of efficiency, there is nothing superior to Domestic Air Compressors. They reduce your drilling cost and time. One Domestic is equal to a dozen men with the old hand method. The difference to you is the difference between a few cents and dollars.



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You can have your "DOMESTIC" Air Compressor mounted on steel truck, rubber tired trailer or ready to mount on truck chassis, in the following sizes: 50, 62, 92 and 184 cu. ft. displacement of free air per minute.

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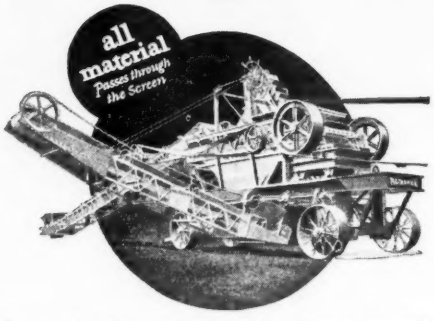
PUMPS—AIR COMPRESSORS—HOISTS

Russell Portable Screening Crushing *and* Loading Plant!



One handling of material performs all three operations—screening, crushing and loading. Conveys the material from gravel pit, screens, crushes and delivers a uniform product directly into wagon, truck or bin.

The feed back principle to crusher makes all material uniform—no oversize can pass the screen. Hopper arrangement and wide 24 inch delivery conveyor affords rapid loading of trucks. Construction of this outfit is most subtantial and durable insuring steady service and long life. Weight complete 28 500 pounds.

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No matter what your needs in elevating, conveying and power transmission machinery there is a Caldwell product to supply the want. Address Caldwell, or nearest Link-Belt office.

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FOR rapidity and economy in the digging of bank or bed materials, in the dry or from under water, there is no more satisfactory device than the Improved Link-Belt Drag Line Cableway Excavator.

It is shovel, conveyor and elevator, all combined in one equipment, and wholly operated by one man. It is low in first cost and in maintenance; economical in outlay for wages and cost of power, and rapid in direct and dependable delivery of materials.

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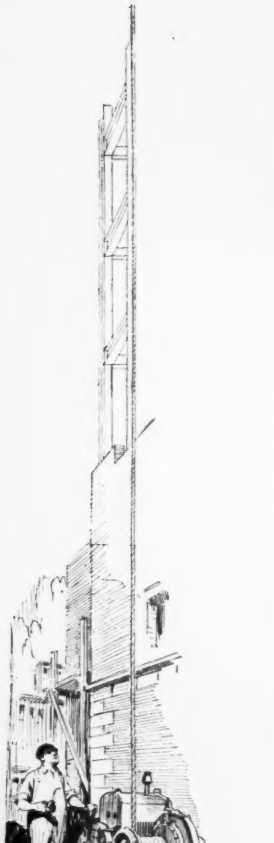
Dependable Power for Every Purpose



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